AUTOMOTIVE INDUSTRIES

PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY
PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT • SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
ENGINEERING • PRODUCTION • MANAGEMENT

OCTOBER 15, 1950

In This Issue . . .

First Die Cast Aluminum Clutch Housing

Hudson's 145 Hp Hornet Engine

Significant Materials Data for Designers

Aircraft Production Efficiencies

What's New at the National Metal Show

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A CHILTON PUBLICATION

what is today's best investment?

When it comes to paying real dividends, you can't beat new Heald equipment!

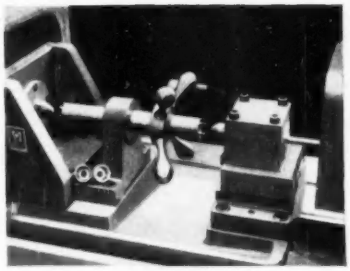
There's no guesswork about an investment in a new Heald machine. The dividends it will pay are a matter of simple arithmetic.

Compare the production rates of the new machine with those of the one it will replace. Then compare the production costs, as related to the net investment required. You'll find that the new, faster, more effficient Heald machine will give you an assured return of 20% — 30% — 50% — and in some cases as much as 100% or more — depending on the *efficiency* (not the age) of the old machine.

Where else today can your invested capital return dividends like these?

Your nearest Heald representative will be glad to study your precision finishing operations and show you exactly how much you can save with a new Heald Bore-Matic, Internal Grinder or Surface Grinder.

Remember, when it comes to precision finishing, it pays to come to Heald.



This New Heald Bore-Matic paid for itself in 11 months!

Used in the tool room of a large diesel manufacturer, this Heald Bore-Matic released three men to other production, saved 20 hours a week of tool room time, and paid off its own cost in 11 months. It is used to finish-bore, face-counterbore, and finish-ream injector system parts to tolerances of 0.0001 and 0.0002 in.

THE HEALD MACHINE COMPANY

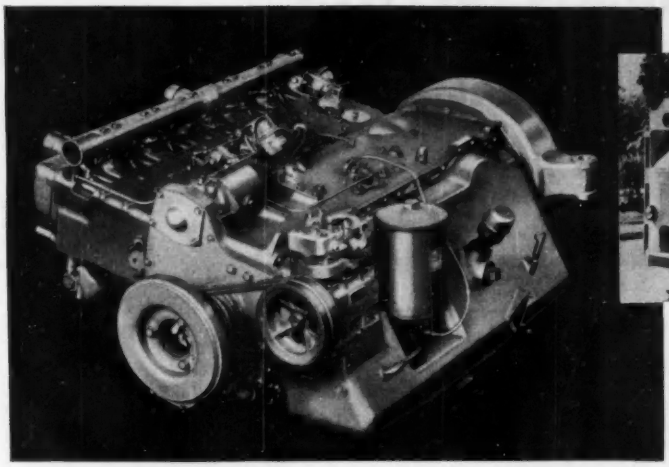
WORCESTER 6, MASSACHUSETTS

HEALD

Branch Offices: Chicago • Cleveland • Dayton • Detroit • Indianapolis • Lansing • New York

WAUKESHA...

LARGEST BUILDERS OF *propane-fueled* POWER



Horizontal **UNDER-FLOOR**
propane-fueled
BUS and TRUCK ENGINE

HIGH OUTPUT Model 140-GKB—6-cylinder engine, 4½-in. x 5½-in., 525 cu. in. displ.

EVER SINCE 1935 America's leading railroads have been equipped with Waukesha **propane engine powered** air conditioning and electric generating systems.

MILLIONS OF ENGINE MILES PER MONTH have been covered by these efficient Waukesha high output, **propane-powered** railway units.

IN BUSES AND TRUCKS the Waukesha **propane-fueled** Engines have made many high speed runs, from Los Angeles to San Francisco, and Seattle to San Francisco.

PROPANE SURPASSES ALL OTHER FUELS —for **economy** . . . for **easy starting** . . . for **high anti-knock** . . . for **super power** — in the Waukesha High Compression, High Output Engines.

POWER YOUR BUSES AND TRUCKS with propane. Put your propane power program in the capable hands of America's pioneer producers of propane-powered engines.

SEND FOR complete information, or consult Waukesha engineers about your individual needs. No obligation.

WAUKESHA ENGINES

WAUKESHA MOTOR COMPANY • WAUKESHA, WISCONSIN

NEW YORK TULSA LOS ANGELES

GET BETTER PERFORMANCE AND CUT COSTS WITH INCO NICKEL ALLOYS

Next time you have a metal selection problem, consider this:

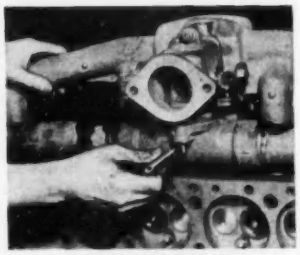
Many small-size forms of INCO Nickel Alloys are no more expensive than comparable ones of less effective metals—and some forms are actually cheaper. This is because of the ease with which ductile INCO Nickel Alloys are formed into wire, wire cloth, strip and small size tubing.

And that's only half the story.

You can drive your fabricating costs down too, because unit operations are fewer. You save all the expense of coatings and special finishes because these materials are solid, corrosion-resistant metals. Fewer anneals are necessary. And you will often need less metal because INCO Nickel Alloys are stronger than structural steels.

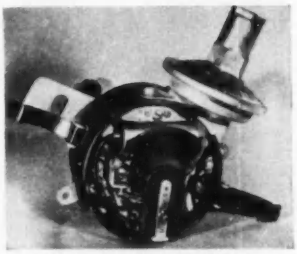
And think of the performance you get with INCO Nickel Alloys. These alloys are rustproof and corrosion-resisting, tough and wear-resisting. They withstand extremes of temperature, and resist vibration fatigue and spark erosion.

Perhaps you have a metal problem right now. You can write us about it or call one of the distributors listed below. You will find out for yourself how many of your metal problems can be solved with INCO Nickel Alloys in small diameter tubing, wire, wire cloth, small diameter rod and perforated metal.



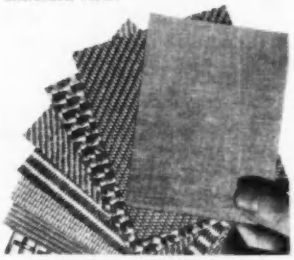
WITHSTANDS HEAT

Automatic choke tubes are made of Inconel for resistance to high heat and corrosion.



RESISTS SPARK-EROSION

Monel's resistance to spark erosion and corrosion increases performance of this distributor rotor.



PROVIDES STRENGTH

High strength of Inco Nickel Alloy wire screen and cloth provides resistance to stress and abrasion as well as corrosion.

INCO NICKEL ALLOYS ARE DISTRIBUTED BY:

Whitehead Metal Products Co., Inc.
Williams and Company, Inc.
Pacific Metals Company, Ltd.
Steel Sales Corporation
J. M. Tull Metal & Supply Co.
Metal Goods Corporation
Eagle Metals Company

THE INTERNATIONAL NICKEL COMPANY, INC.

67 Wall Street, New York 5, N. Y.

EMBLEM OF SERVICE
NICKEL INCO ALLOYS

MONEL® • "K"® MONEL • "R"® MONEL • "KR"® MONEL
NICKEL • LOW CARBON NICKEL • DURANICKEL®
INCONEL® • INCONEL "X"®.

AUTOMOTIVE INDUSTRIES

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Contents

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SIMONDS
ABRASIVE CO.

Abrasive Segments
for speed and savings in grinding

Use Simonds Abrasive Company Segments . . . economical . . . fast . . . cool cutting . . . for surfacing large areas, a number of small pieces chucked together or machine knife grinding. In all sizes to fit all segmental chucks, solid or gap type.

Simonds Abrasive Company's complete line offers everything you need for vertical or horizontal surfacing . . . everything you need, including Straight Wheels, Cup Wheels, Disc Wheels, Cylinder or Ring Wheels, for all your grinding jobs. For information on abrasive segments, write for Bulletin ESA 188.

GRINDING WHEEL INSTITUTE MEMBER

SIMONDS ABRASIVE COMPANY, PHILADELPHIA 37, PA., DISTRIBUTORS IN PRINCIPAL CITIES

DIVISION OF SIMONDS SAW AND STEEL CO., FITCHBURG, MASS. OTHER SIMONDS COMPANIES: SIMONDS STEEL MILLS, LOCKPORT, N.Y., SIMONDS CANADA SAW CO., LTD., MONTREAL, QUE. AND SIMONDS CANADA ABRASIVE CO., LTD., ARVIDA, QUE.

Oil Seal Rings...

FOR AUTOMATIC TRANSMISSIONS

Sealing rings with locked joints.
(Enlarged view shows locked position)

Policy

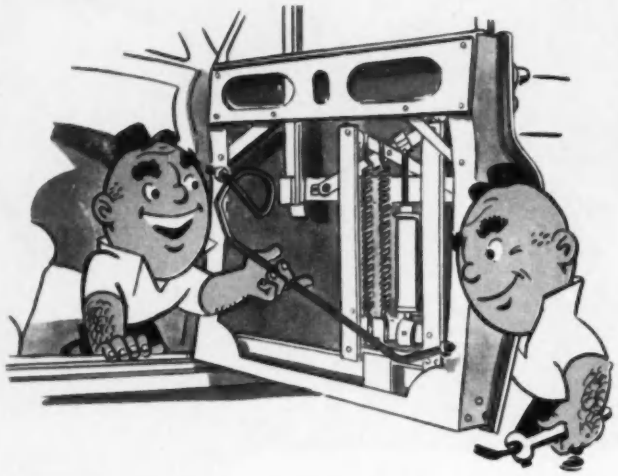
"It is Muskegon's firmly established policy to sell exclusively to manufacturers (1) for installation as original equipment and (2) for resale for service purposes."

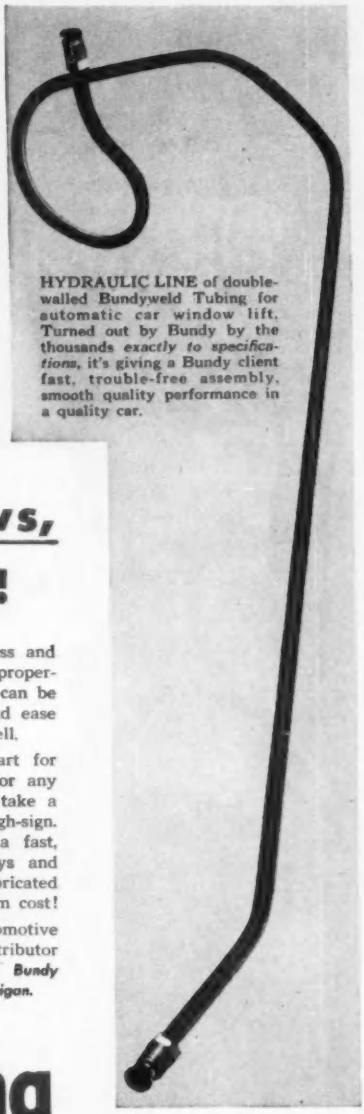
OIL SEAL RING HEADQUARTERS

MUSKEGON
Piston Rings

MUSKEGON PISTON RING CO.
MUSKEGON, MICHIGAN
PLANTS AT MUSKEGON AND SPARTA

"THE ENGINE BUILDERS' SOURCE"





HYDRAULIC LINE of double-walled Bundyweld Tubing for automatic car window lift. Turned out by Bundy by the thousands *exactly to specifications*, it's giving a Bundy client fast, trouble-free assembly, smooth quality performance in a quality car.

Better automatic windows, too . . . with Bundyweld!

Why not!

Hydraulic lines for automatic window lifts in your sleek, new sedan or convertible must be foolproof, leakproof, vibration-resistant. In short, *thoroughly dependable the life of the car.*

And Bundyweld's record in fuel, oil and hydraulic brake lines in cars for over 20 years is evidence within your field of the performance you can expect from Bundyweld in this latest automotive application, too.

Back of that record, *always*, is Bundyweld's double-walled construction. Two walls (from a single strip!) instead of one . . . for extra strength, greater endurance under stress and jolts, and amazing leakproof properties. It's light in weight and can be fabricated with the speed and ease that mean extra savings as well.

Too, if your new tubing part for automatic window lifts, or for any other automotive use, must take a special bend, just give the high-sign. Bundy engineers will give a fast, skilled hand in finding ways and means to turn out your fabricated unit in volume, at rock-bottom cost!

For all the Bundyweld automotive story, contact a Bundy distributor listed below. Or call or write: ***Bundy Tubing Company, Detroit 14, Michigan.***

Bundyweld® Tubing

DOUBLE-WALLED FROM A SINGLE STRIP

WHY BUNDYWELD IS BETTER TUBING

Bundyweld starts as a single strip of basic metal, coated with a bonding metal. Then it's . . .

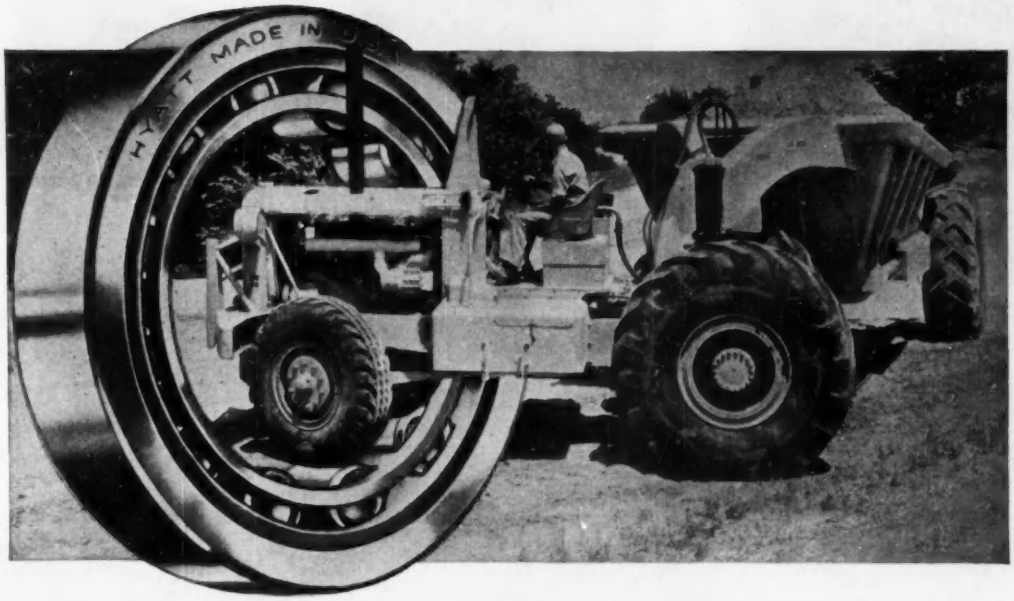
continuously rolled twice around laterally into a tube of uniform thickness, and

passed through a furnace. Bonding metal fuses with basic metal, presto—

Bundyweld . . . double-walled and brazed through 360° of wall contact.

NOTE the exclusive patented Bundyweld beveled edge, which affords a smoother joint, absence of bead and less chance for any leakage.

Bundy Tubing Distributors and Representatives: ***Cambridge 42, Mass.:*** Austin-Hastings Co., Inc., 226 Binney St. • ***Chattanooga 2, Tenn.:*** Peirson-Deakins Co., 823-824 Chattanooga Bank Bldg. • ***Chicago 32, Ill.:*** Lapham-Hickey Co., 3333 W. 47th Place • ***Elizabeth, New Jersey:*** A. B. Murray Co., Inc., Post Office Box 476 • ***Philadelphia 3, Penn.:*** Rutan & Co., 404 Architects Bldg. • ***San Francisco 10, Calif.:*** Pacific Metals Co., Ltd., 3100 19th St. • ***Seattle 4, Wash.:*** Eagle Metals Co., 3628 E. Marginal Way ***Toronto 3, Ontario, Canada:*** Alloy Metal Sales, Ltd., 881 Bay St. • **Bundyweld nickel and Monel tubing is sold by distributors of nickel and nickel alloys in principal cities.**



HYATT and CATERPILLAR Partners in Performance

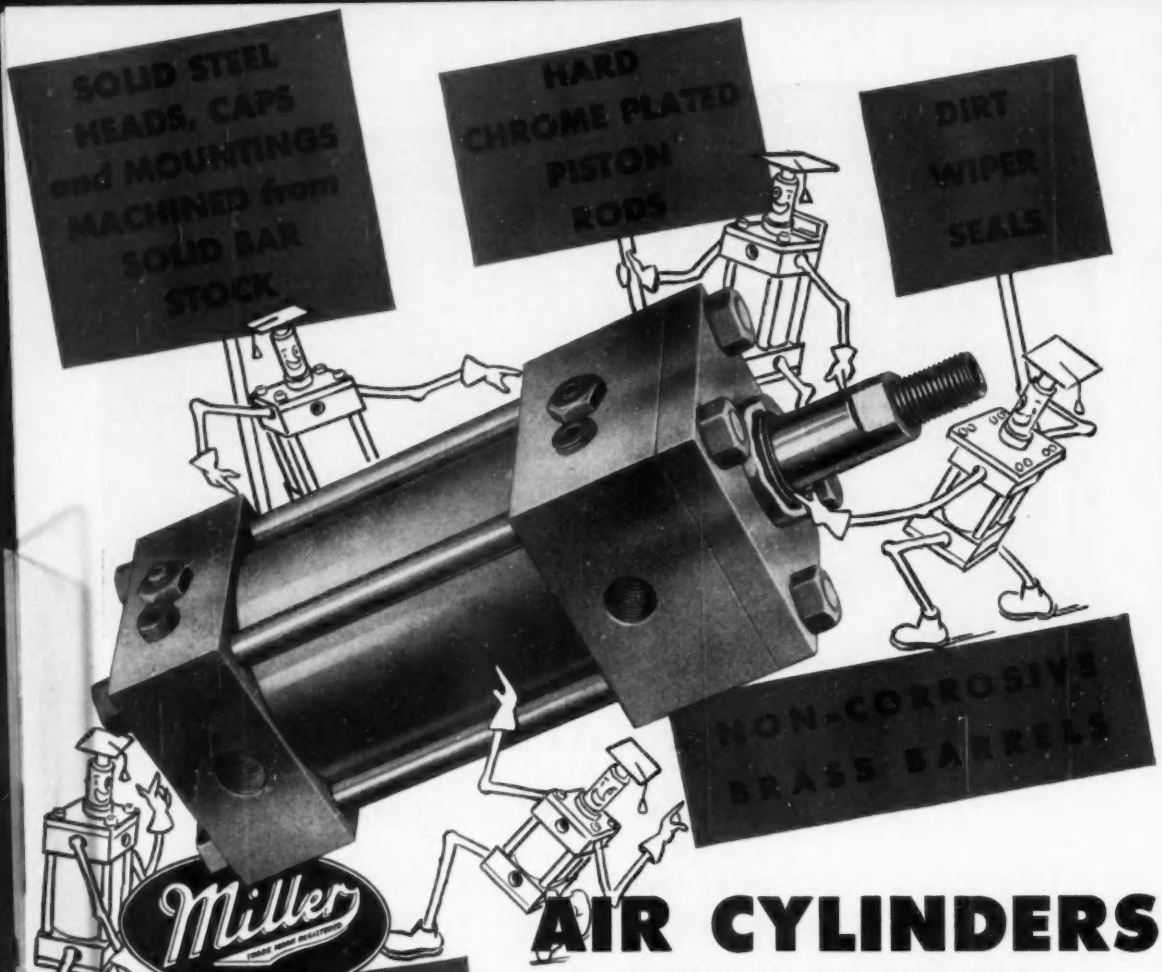
THE new "CAT" DW20, latest of Caterpillar Tractor Co.'s wheel tractors, is the result of five years of intensive research, design engineering and job-proved application.

One of the outstanding features that provides dependability and easier operation of this new tractor is the application of Hyatt Roller Bearings. Proved through the years on all types of "Caterpillar" products, Hyatts make the turning of wheels, gears and shafts easier—reduce wear and care—perform smoothly under the toughest conditions and come back the next day ready for more.

• • •

With Hyatts in the vital positions, Caterpillar, like so many equipment builders, helps build performance into the equipment they make. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

HYATT ROLLER BEARINGS



AIR CYLINDERS

SOLID STEEL HEADS, CAPS and MOUNTINGS. Eliminate dangerous, costly breakage under even the severest operating conditions . . . assuring longest possible cylinder life. Standard construction on ALL Miller Cylinders—*both Air and Hydraulic.*

HARD CHROME PLATED PISTON RODS. 90,000 to 110,000 psi yield point heat treated stress relieved steel, accurately ground, polished, then hard chrome plated for extra high resistance to the scratches that commonly cause leakage.

DIRT WIPERS. Wipe piston rods clean on every "in" stroke, protecting piston rods, seals, and bushings from scratch-damage by dirt, scum, abrasive particles. Standard construction on ALL Miller Cylinders — *both Air and Hydraulic.*

NON-CORROSIVE BRASS BARRELS. Eliminate the rust and corrosion caused by moisture always prevalent in plant air lines. Standard construction on all Miller Air Cylinders.

Benefits to You

No Broken Castings
No Scratch-Damage to Piston Rods, Bushings and Seals
NO COSTLY "DOWNTIME"
NO REPAIRS
NO MAINTENANCE
NO POWER WASTAGE

Write for illustrated cylinder bulletins A-105 and H-104

COMPLETE MILLER CYLINDER LINE INCLUDES: AIR CYLINDERS, 1½" to 20" BORES, 200 PSI OPERATION; LOW PRESSURE HYDRAULIC CYLINDERS, 1½" TO 6" BORES FOR 500 PSI OPERATION, 8" TO 14" BORES FOR 250 PSI; HIGH PRESSURE HYDRAULIC CYLINDERS, 1½" TO 12" BORES, 2000-3000 PSI OPERATION. ALL MOUNTING STYLES AVAILABLE.

MILLER MOTOR COMPANY

4031-33 N. KEDZIE AVENUE - - CHICAGO 18, ILLINOIS

AIR AND HYDRAULIC CYLINDERS · ACCUMULATORS · COUNTERBALANCE CYLINDERS · BOOSTERS · AIR HOISTS

CLEVELAND — PITTSBURGH — PHILADELPHIA — DETROIT — YOUNGSTOWN — BOSTON
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MILWAUKEE — NASHVILLE — SEATTLE — LOS ANGELES — SAN FRANCISCO — BALTIMORE
ST. LOUIS and OTHER AREAS.

Sales and Service from coast to coast

Steering AT ITS BEST

MODEL 372M INTERCITY GENERAL AMERICAN AEROCOACH

ROSS BRINGS EASE . . . AND ECONOMY

ALL OF THE outstanding features of Aerocoach models have been retained or *improved* and *added to*, in the new Model 372M produced by General American Aerocoach. This fine new coach is referred to as "The coach of tomorrow—*TODAY*." And, of course, it is equipped with Ross Steering.

The Ross policy of incorporating advancements in design as they are proved by exhaustive tests has resulted in many recent improvements. Current Ross models have:

(1) ***Increased mechanical reduction*** . . . (2) ***More compactness*** . . . (3) ***Reduction in weight*** . . . (4) ***Greater arm angular-travel*** . . . (5) ***Improved metallurgy*** . . . (6) ***Increased efficiency.***

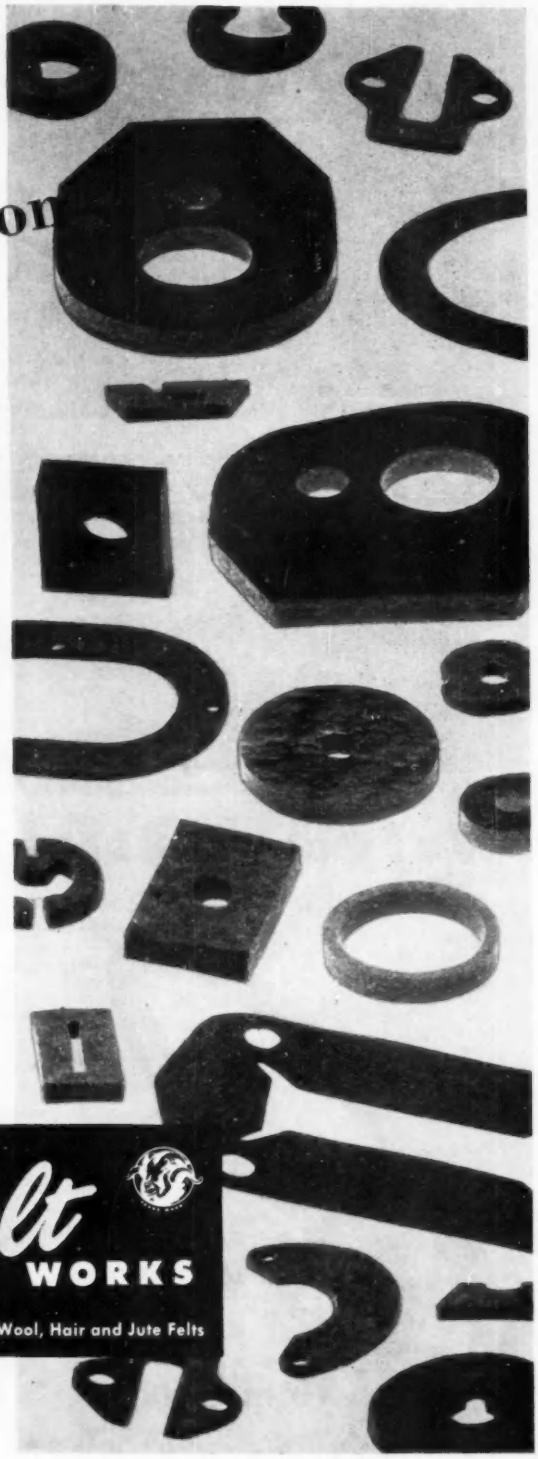
Throughout 43 years of leadership in this industry, Ross gears have been distinguished for long life, simplicity of adjustment and maintenance of long-recognized qualities of safety, stability and performance. We invite discussion of any steering problem.

Ross

Cam & Lever **STEERING**

ROSS GEAR AND TOOL COMPANY • LAFAYETTE, INDIANA

for top precision



Production to close tolerances mostly applies to metal working. But the technique of Western Felt production and processing has built an enviable reputation for engineering precision.

Chemical specifications must be perfectly met — parts from wool softness to rock hardness are cut to close tolerances. As an extremely versatile material Western Felts are resilient, flexible, compressible. They resist oil, water, heat age — do not ravel, fray or lose shape. New uses found daily. It pays to depend on Western Felt.

Check Possible Uses for Your Product

- Excluding dirt, grit, dust • Retaining lubricants
- Thermostatic insulation • Isolating vibration
- Cushioning shock • Padding, packing, seals
- Air and liquid filters • Gaskets, channels, etc.
- Grinding, polishing, etc. • Weight reduction
- Instrument mounts

WESTERN Felt WORKS

4035-4117 Ogden Ave., Chicago 23, Illinois
Branch Offices in Principal Cities

Largest Independent Manufacturers and Cutters of Wool, Hair and Jute Felts

Acadia Synthetic Products Division, WESTERN FELT WORKS, Processors of Synthetic Rubbers — Sheets, Extrusions, Molded Parts.

the Doctor of Motors Rumor Page

IT'S RUMORED THAT

Perfect Circle will soon announce a sensational new piston ring set!

RIGHT!

And when this announcement breaks, which will be very soon, it will be the hottest news in the automotive parts industry!

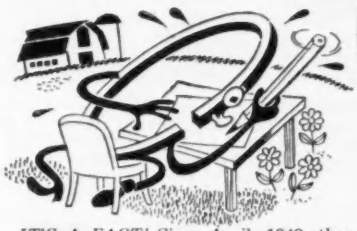
IT'S RUMORED THAT

This amazing new ring set has been 8 years a-making!

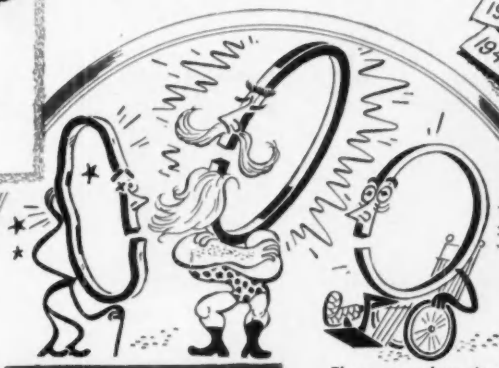
TRUE! The development of this new ring set began in 1942—and since then, PC engineers have worked steadily to perfect it. Today, over 8 years after work began, it will soon be ready for you!

IT'S RUMORED THAT

There was a twenty-month "final examination" for this ring set—*in the field!*



IT'S A FACT! Since April, 1949, thousands of test installations have been made in all types of engines—new and old cylinders, in good and in horrible condition, slow, fast, constant and intermittent service, and under both clean and dusty conditions. Final score: head of the class!

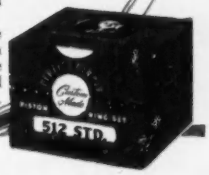


IT'S RUMORED THAT

These marvelous ring sets will reduce cylinder wear as much as *5 to 1*—and outlast any piston ring set ever made!

POSITIVELY PROVED! The exhaustive tests which these ring sets have undergone show unquestionably that they will reduce cylinder wear to one-fifth of that caused by any ordinary ring set—and that they will stand up *longer* and better than any other rings in *every* installation!

Yes, again Perfect Circle will raise the accepted standards of piston ring performance. You'll get the whole story of this sensational new piston ring set soon. *Watch for it!*



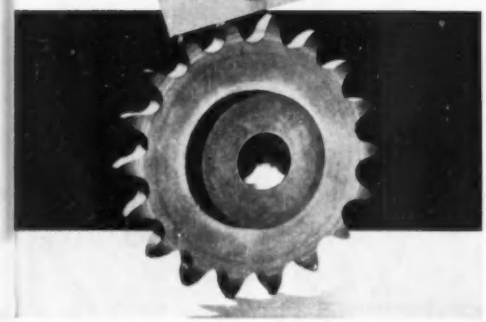
Perfect Circle

The Most Honored Name in Piston Rings

MIDWAY BETWEEN HARD AND SOFT RUBBER

New thermosetting plastic, known as ENRUP, offers a flexibility *or* rigidity that rubber can't provide

BETWEEN THE EXTREME ELASTICITY of soft rubber (the strip at extreme left) and the rigidity of hard rubber (strip at extreme right) are 4 strips of ENRUP. Note varying degrees of flexibility, making ENRUP a true bridge between hard and soft rubber. It is about one-half the weight of aluminum.



SPROCKET MOLDED FROM ENRUP. Note the absence of metal bearing. This great new plastic has unusual abrasive resistance, can be molded to close tolerances, eliminating need for elaborate finishing operations. ENRUP can be machined.

TRUCK AND PASSENGER CAR distributor caps molded from ENRUP are tougher. The rotor in foreground is also longer wearing. ENRUP has *high impact strength* and a degree of *toughness* and *flexibility* heretofore lacking in the plastics field.

ENRUP IS FABRICATED AND MOLDED ENTIRELY BY U. S. RUBBER ENGINEERS

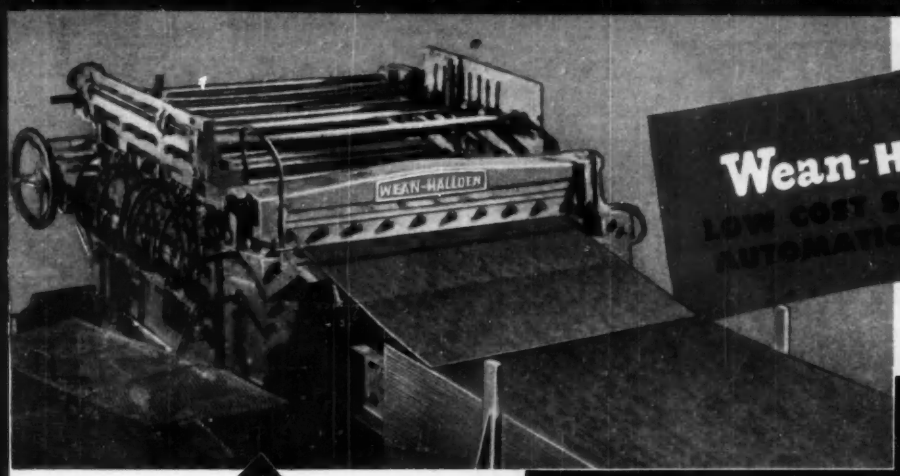
It is especially valuable on heavy-duty lathes, household appliances, plating barrels, and for dozens of other applications. Gears made of ENRUP, for example, have been operating for more than a year in applications where conventional metal gears have failed within a few weeks. CAN YOUR PRODUCT be improved by this versatile material? It has an adaptability that may mean increased success for your product. Write to:

A PRODUCT OF

U.S.RUBBER
SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION, ROCKEFELLER CENTER, NEW YORK 20 N. Y.



Wean-Hallden

LOW COST SYNCHRONIZED AUTOMATIC SHEAR LINES

THE installation of a Wean-Hallden Synchronized Automatic Shear Line assures you the most efficient shearing operation available today. The Wean-Hallden, while actually requiring *less floor space,* delivers up to *twice the production.*

Infinite variable lengths from 12-inches to 12-feet at speeds up to 200 FPM with accuracy better than commercial tolerances means faster production, reduced labor costs and minimum scrap loss for you. *Before You Buy—Investigate Wean-Hallden.*

If you are in the business of handling strip steel or fabricating steel parts or products from strip steel you should give your slitting operation high consideration.

Well designed slitting lines enable you to reduce inventories, lower labor costs and eliminate expensive extras. Wean engineered slitting lines give you these important factors at lowest initial costs.

If you have a slitting problem — or merely desire a check on the efficiency of your present operation — call in Wean specialists.

Wean *Equipment Corporation*

CLEVELAND, OHIO

Bendix Products Division

CREATIVE ENGINEERING

GEARED TO QUANTITY PRODUCTION

75 MILLION BRAKES

PRODUCED FOR THE AUTOMOTIVE INDUSTRY

Producing 75 million brakes is a remarkable accomplishment even in these days of large numbers and mass production methods. This remarkable record is made possible because Bendix Products Division has such things as —

A quarter century of specialized experience

Recognized engineering excellence

Research that has set the pace in design development

Proved manufacturing skill and capacity

Overwhelming endorsement of the automotive industry

Manufacturers who put their braking problems up to Bendix — regardless of the type of vehicle — soon see what this matchless experience in the fields of creative engineering and quantity production can do.

BENDIX · PRODUCTS DIVISION · SOUTH BEND

Export Sales: Bendix International Division, 72 Fifth Ave., New York 11, N.Y. • Canadian Sales: Bendix-Eclipse of Canada, Ltd., Windsor, Ontario, Canada

AVIATION CORPORATION

Centramount Emergency and Parking Brake

S-A-F® Power Braking System for Cargo Trailers

Bendix Hydraulic Power Steering

BUILDERS OF THE BASICS OF BETTER MOTOR VEHICLES

Bendix® Automatic Clutch and Gear Shift Control Systems

Bendix Vacuum-Power Gear Shifter

Bendix® Brakes for Buses, Trucks, and Passenger Cars

AUTOMOTIVE INDUSTRIES

AUTOMOTIVE INDUSTRIES
Reg. U. S. Pat. Off.

High Spots of This Issue

★ **Development of the Die Cast Aluminum Clutch Housing**

An interesting report telling why the final design of the new Nash aluminum clutch housing was dependent upon stress analysis tests under simulated road testing conditions. See page 32.

★ **Obtaining Efficiencies in Aircraft Production**

How the Douglas El Segundo plant has setup operations in order to obtain time and cost economy is related in this timely article beginning on page 34.

★ **Materials Data for Designers**

Obtaining a reliable design index by the testing of actual components is discussed in this issue. Test methods and testing equipment are described in some detail. Page 38.

★ **Latest Cast Iron Advances**

Many problems involving cast iron have been solved this past year; the authors tell of these advances and of new problems that have been brought to light. See page 42.

★ **Materials Outlook**

A report direct from Washington telling how the present defense production is gradually causing some materials to become short. The immediate future seems to hold nothing worse than tightened belts and spot shortages—real impact will not come until next spring, according to the author. Page 44.

★ **1951 Hudson Highlights**

A new series, a new engine, and Hydra-matic have been added to the Hudson line for '51. Improvements and specifications on the Super and Pacemaker series as well as the all new Hudson Hornet are published in this article beginning on page 56.

★ **Many New Product Items And Other High Spots Such As:**

32nd National Metal Show and Exposition; over 30 products to be displayed at the Metal Show; and a report from the SAE National Aeronautic Meeting.

News of the Automotive Industries, Page 17
For Complete Table of Contents, See Page 3

News of the AUTOMOTIVE INDUSTRIES

Vol. 103, No. 8 October 15, 1950

New Body to be Added to 1951 GM Line

Although changes in the GM lines for 1951 will not be extensive, it is reported that one new body style will be added. It is understood that it will be used on the Oldsmobile 88 and in the Buick line, and possibly by Pontiac.

Willys to Convert Six to F-Head Design

It is reliably reported that Willys has ordered tooling for converting the present Willys six engine to F-head design. Experimental engines using the F-head are said to show an appreciable gain in performance.

GM Abandons Plans for New York Show

Automobile shows are apparently a casualty of the Korean War and the generally unsettled international situation. GM has abandoned plans for its annual show in New York City originally scheduled for mid-January. The reasoning of the company is that diversion of manpower and materials for an automobile show at a time of international crisis would not be propitious. For the same reason, the automobile manufacturers have abandoned preliminary plans for an automobile show to be held next year in Detroit in connection with the city's 250th anniversary celebration.

Hudson Fifth Company to Raise Car Prices

Because of higher costs, Hudson has announced price increases ranging from $98 to $102 on its 1951 models. Hudson is thus the fifth automobile manufacturer to increase prices since late August. The Hudson increases, according to N. K. Vanderzee, vice president in charge of sales, are well within the range of previous price cuts over the last 18 months ranging from $102.50 to $240.

Twin Coach Unveils New Motorized Trailer

The Twin Coach Co. has unveiled a new motorized truck trailer called the Fageol Super Freighter. Standard trailers made by the Fruehauf Trailer Co. will be used by Twin Coach in building the new units which will have the power unit under the floor of the vehicle.

Rambler Sedan Delayed Until Next Year

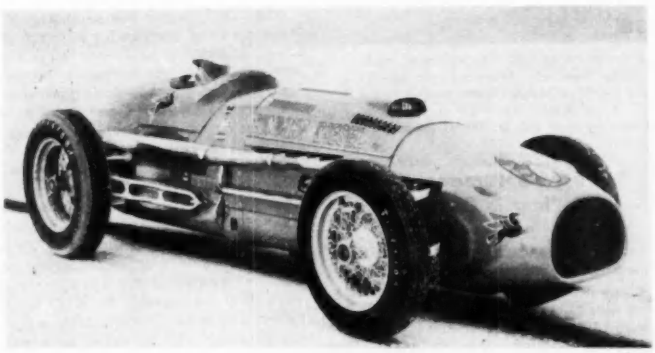
Nash will not get into production of its two-door Rambler sedan until some time after the first of the year. A factory expansion program at Milwaukee will not be completed until late this year at the earliest. The added facilities are to be used for production of Rambler bodies.

Chrysler Using New Type Radiator Pressure Cap

The Chrysler Corp. has developed a new type radiator cap designed to give sealed pressure cooling under abnormal conditions but to allow atmospheric pressure cooling in normal driving. The new cap is currently being used on all lines of Chrysler cars. The basic principle of the radiator cap is a special vent valve which is forced shut, sealing the cooling system when the temperature rises to the boiling point. Under normal operating conditions, however, the valve remains open allowing the pressure inside the cooling system to equalize with outside atmospheric pressure.

1950 Car and Truck Output Already Ahead of 1949

By the middle of this month the automobile industry had passed the all-time record of 6,253,602 cars and trucks established in 1949, and is now well on the way to a 7 million plus production year. Steel is still the key to how far production of cars and trucks this year will exceed last year's record, but industry consensus is that output will remain at present high levels, at least for the rest of this year except for short periods when various companies are down for changeovers. New cars will exceed the previous record by a wide margin, and there is also a good possibility that truck output will hang up a new record even exceeding the previous mark of 1,376,155 established in 1948. Labor trouble has unexpectedly complicated the production figures in recent weeks, but with most settlements out of the way, the outlook is for more stable conditions and uninterrupted production for the rest of the year.



Acme

SET SIX!

Jimmy Jackson is behind the wheel of the Cummins Diesel Special No. 61 in which he set six American and six international Diesel records, from one kilometer to 10 miles. The new records for mile lengths are: one, 165.23 mph; five, 161.92 and 10, 148.14. The race car engine develops over 340 hp at 4000 rpm.

C. E. Wilson, GM president, told stockholders recently that GM looks for high production not only through the rest of this year, but that the first quarter of 1951 will be about equal to the best quarters of this year. Meanwhile, new car sales have tapered off somewhat from the record high levels of July and August. Latest figures indicate that registrations of new cars and trucks for August were at an all time high of 683,995 units, considerably above the previous all-time record of 609,926 established in July. New truck registrations also hit a new high of 126,533 to exceed the July record of 117,040. Consequently, new car and truck registrations for August set an all-time record of 810,528.

Buick Starts Building New Plant

Buick has started construction of a large new plant at Flint, Mich., just north of the company's present facilities. Although Buick did not reveal what the plant will be used for, it is understood that it will be tooled for engine production, among other things, indicating that the long expected overhead valve V-8 engine will be produced there for 1952 models. The new plant will have 666,000 sq ft of floor space. Buick production this year will hit approximately 500,000 units and facilities at the present plant are badly overcrowded.

Mercury Names Automatic Drive "Merc-O-Matic"

The name of the automatic transmission to be offered on the 1951 Mercury as optional equipment will be the "Merc-O-Matic." The same unit is to be offered on the 1951 Ford later and will be called the "Ford-O-Matic."

ONE AND SIX

This LD-305 Roadliner model is one of a new line of heavy-duty Diesel-powered trucks introduced by International Harvester Co.'s motor truck div. Models in the LD-304 Loadstar series have a GVW of 36,000 lb, and a GCW of 76,800 lb, and models in the LD-305 Roadliner series have a GVW of 30,000 lb and a maximum GCW of 76,000 lb. One standard and six optional Diesel engines ranging from 165 to 300-hp are offered.

Bell Buys Government-Owned Plant in Buffalo

The Bell Aircraft Corp. has announced the purchase of a former Government-owned plant in Buffalo, N. Y. which was operated by the Otis Elevator Co. during World War II. Bell has been expanding operation to meet its war production requirements. The company said the newly-acquired property will be designated the Northland Plant, and it will be used for manufacturing and warehousing. Built at a cost of $1,460,000 in 1942, it has 114,000 sq ft of space.

Williams Succeeds Davis as Ford Sales Chief

Walker A. Williams has been named vice president in charge of sales and advertising for the Ford Motor Co. Formerly Ford Division sales manager, he succeeds John (Jack) R. Davis, who resigned the post because of ill health. Mr. Davis continues with the company, however, as a director, member of the executive committee, and vice president on special assignments.

Chrysler May Drop Six from 1951 Model Line

Indications are growing that Chrysler Div. of the Chrysler Corp. will use only the new overhead valve V-8 engine in its 1951 models. It is understood that the Chrysler six engine will be used in the DeSoto next year, indicating that Chrysler will not offer a six in its new line.

GE Buys Name, Patents of Turbodyne Corp.

The General Electric Co. has purchased the patents, name and technical data of Turbodyne Corp. of Hawthorne, Calif., a research subsidiary of Northrop Aircraft, Inc The company has developed a combination jet and propeller aircraft engine which GE says is believed to be the most powerful propeller-type aircraft power plant in the world.

K-F May Build Ships in West Coast Yard

The government has no interest in Willow Run at present for military contracts, according to Edgar F. Kaiser, president. He has revealed, however, that K-F has already done preliminary design work on new types of ships under a contract with a New York naval architect. In the event of a K-F contract to build ships, the work would be done at facilities in the Pacific northwest operated by the Kaiser interests during the war, and currently not being used. Also, if Kaiser interests, rather than K-F, obtain a shipbuilding contract, expenditures for advance design work will be repaid to K-F by the Kaiser interests. Stockholders in a special meeting will be asked to approve the proposal that K-F enter the shipbuilding business in addition to manufacture of automobiles. The company says that even if a contract is obtained, it will not interfere with production of cars at Willow Run.

INDUSTRIES

Fisher Body Pittsburgh Plant in Operation

Operations at the new Pittsburgh plant of the Fisher Body Div. of GM are well underway although it will still be a few months before the plant is fully completed and operating at capacity. The new unit will supply 21 domestic assembly plants with a complete line of panels, roofs, and other sheet metal body parts. Total floor space of the new unit built on a 68-acre site near Pittsburgh is 800,000 sq ft of which 651,800 sq ft is manufacturing area. The operation is divided into two major departments: one for producing large stamping dies and tools, and the other for fabricating body parts.

Willys Raises Prices 2 to 8 Per Cent

Willys-Overland has advanced list prices from two to eight per cent because of higher labor and material costs. The company says that labor costs have gone up 12 per cent, and that material increased nearly nine per cent. The change is the first general price increase for Willys since June, 1948. Willys recently granted a wage increase calling for a 10 cents general boost with an additional five cents for skilled workers. Also included in the settlement were increases in bonuses for second and third shifts and improved vacations, pensions and insurance. Ward M. Canaday, president and chairman of Willys, says that working capital now stands at more than $27 million, highest in the past 14 years despite expenditure of about $35 million since the end of the war for plant improvements and facility expansion.

War Contracts Emphasize Aircraft Boom

The Bell Aircraft Corp. has announced that it has received the largest single quantity order for helicopters ever awarded by the U. S. military forces. These helicopters will see service with the Army Field Forces. Twin Coach Co.'s Cheektowaga plant, near Buffalo, N. Y., has received "letters of intent" for about $12 million in orders from two aircraft companies. It plans to triple employment and expand its local factory. The "letters of intent" have been received from Grumman Aircraft Engineering Corp., Bethpage, N. Y., and Piasecki Helicopter Corp., Morton, Pa. A sub-contract to manufacture an undisclosed quantity of major assemblies for an advanced version of the Lockheed Navy P2V Neptune patrol bomber series has been awarded to Texas Engineering & Manufacturing Co., Inc., Dallas, Tex. The company has also received a "go ahead" to convert an undisclosed number of Air Force C-54 cargo transports into flying hospitals for the Military Air Transport Service.

The U. S. Dept. of Commerce has also announced the following Defense Dept. contracts for aircraft parts and service: Douglas Aircraft Co., Inc., $12.9 million; Republic Aviation Corp., $4.3 million; Curtiss-Wright Corp., $4.9 million; Wright Aeronautical Corp., $5.8 million; Lockheed Aircraft Corp., $3.6 million; and for turbo-jet development and engines, Pratt & Whitney Aircraft Div., United Aircraft Corp., $7.9 million.

TEN BEHIND

Recently added to Chrysler's line, this new Town and Country Wagon, a four-door, six-passenger station wagon, has a fold-down rear seat arrangement that provides up to nearly 10 feet of cargo space behind the front seat. The rear window can be rolled down completely into the tailgate.

High Production at K-F Sends Earnings Up

Kaiser-Frazer is operating at a satisfactory profit and the outlook is good for the foreseeable future, according to Edgar F. Kaiser, president. He says that demand for the Kaiser line is exceptionally heavy, and has shown no signs yet of declining. Production is also at a high rate, averaging about 800 Kaisers and 400 Henry Js a day, and is expected to go to 1600 daily by December divided equally between the Kaiser and the Henry J lines. K-F has introduced the Henry J at a factory delivered price of $1299 for the four-cyl model, and $1429 for the Henry J Deluxe six-cyl model. Mr. Kaiser said that manpower and steel both are very tight for K-F. The com-

1950 MOTOR VEHICLE FACTORY SALES FROM U. S. PLANTS*

	Passenger Cars	Trucks	Buses	Total Vehicles 1950	Total Vehicles 1949
First Quarter	1,342,803	294,137	551	1,637,491	1,376,059
Second Quarter	1,751,399	380,145	1,278	2,112,822	1,818,225
Total—Six Months	3,094,202	654,282	1,829	3,750,313	2,964,284
July	595,067	111,206	397	706,672	579,048
August	682,782	134,853	457	818,092	657,664
Total—Eight Months	4,372,051	900,343	2,683	5,275,077	4,230,996

1950 DOMESTIC TRUCK FACTORY SALES BY G.V.W.*

	5,000 lb. and Less	5,001-10,000	10,001-14,000	14,001-16,000	16,001-19,500	19,501-26,000	Over 26,000	Total
First Quarter	126,709	57,323	20,036	39,476	9,080	7,447	5,055	265,126
Second Quarter	158,072	65,209	21,510	45,180	11,572	10,427	7,557	322,527
Total—6 Months	284,781	122,532	41,546	87,656	20,652	17,874	12,612	587,653
July	47,590	20,991	6,550	13,489	3,780	3,489	2,694	99,573
August	58,084	24,223	7,674	16,395	4,672	5,163	2,861	121,272
Total—8 Months 1950	390,455	167,746	55,770	119,540	29,304	26,526	18,167	807,498
Total—8 Months 1949	310,992	195,352	54,477	108,176	19,266	13,600	9,800	711,663

* Automobile Manufacturers Association.

1950 NEW PASSENGER CAR REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1950 Eight Months' Totals.

	August 1950	July 1950	August 1949	Eight Months Units 1950	Eight Months Units 1949	Eight Months Per Cent of Total 1950	Eight Months Per Cent of Total 1949
Chevrolet	147,369	126,897	114,034	942,389	854,576	22.85	21.19
Ford	113,067	99,694	77,660	787,632	496,464	19.11	16.07
Buick	55,466	48,884	33,668	354,963	246,246	8.61	7.97
Pontiac	45,786	39,279	34,264	294,816	206,557	7.14	6.66
Plymouth	71,740	61,419	50,911	291,619	329,609	7.07	10.67
Oldsmobile	37,601	33,153	26,734	247,223	173,822	5.99	5.63
Mercury	29,371	28,773	18,189	214,838	111,909	5.21	3.62
Studebaker	26,026	24,828	13,820	197,232	123,696	4.78	4.00
Dodge	43,706	37,182	29,733	175,070	163,079	4.25	5.28
Nash	18,147	20,251	13,763	127,997	92,124	3.10	2.98
Hudson	15,435	15,918	11,480	104,038	100,953	2.52	3.27
Chrysler	20,641	18,134	12,956	86,220	82,660	2.09	2.68
De Soto	16,631	14,173	9,869	65,001	65,493	1.58	2.12
Cadillac	12,566	9,301	6,900	60,414	54,066	1.46	1.75
Kaiser	14,507	13,116	6,216	52,300	44,063	1.27	1.43
Packard	3,836	7,046	9,857	48,815	67,574	1.18	2.19
Willys	4,668	4,522	2,825	24,054	19,571	.58	.63
Lincoln	3,570	3,308	3,066	23,066	25,789	.56	.83
Frazer	1,106	1,677	1,008	10,726	13,535	.26	.44
Crosley	849	754	778	4,807	7,695	.12	.25
British Austin	556	606	230	4,106	2,045	.10	.07
British Ford	262	199	388	1,004	4,463	.02	.14
Misc. Domestic	398	222	12	809	1,463	.02	.05
Misc. Foreign	1,389	892	315	4,922	2,191	.13	.08
Total—All Makes	663,995	609,926	478,550	4,123,858	3,088,649	100.00	100.00

*—Data from R. L. Polk & Co.

pany is getting only seven per cent of its total steel requirements under allocation from the mills with the balance being furnished by steel companies which have a contractual arrangement with K-F to supply a specified tonnage because of financial interest in the facilities. He said that pig iron is also becoming increasingly scarce, and that the company is planning to open its Provo, Utah, furnace either for a munitions center or for supplying civilian industry.

Continental Earnings Show Sharp Increase

Continental Motors Corp. earnings for the quarter ended June 30 of this year were $1,319,316, up substantially over the preceding quarter and nearly three times as great as the same period last year. For the nine months ended July 31, net earnings totaled $2,513,667, compared with $1,701,005 a year ago.

1950 NEW TRUCK REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1950 Eight Months' Totals.

	August 1950	July 1950	August 1949	Eight Months Units 1950	Eight Months Units 1949	Eight Months Per Cent of Total 1950	Eight Months Per Cent of Total 1949
Chevrolet	46,851	46,049	29,696	278,744	230,464	36.98	36.71
Ford	31,239	30,986	19,933	207,655	117,005	27.55	18.64
International	13,648	10,150	8,331	69,828	61,001	9.26	9.72
G.M.C.	10,984	9,864	7,551	62,839	54,206	8.33	8.63
Dodge	11,771	9,155	10,180	58,488	77,380	7.76	12.32
Studebaker	4,904	4,674	4,950	32,342	38,067	4.29	6.06
Willys-Truck	1,822	1,718	1,253	9,644	13,905	1.28	2.21
White	1,173	990	615	7,177	5,437	.95	.87
Mack	765	678	603	6,051	4,167	.80	.66
Willys-Jeep	916	721	948	5,596	10,739	.74	1.71
Diamond T	588	499	369	3,718	3,665	.49	.58
Divco	459	332	237	2,596	2,419	.34	.38
Reo	369	297	276	2,195	2,673	.29	.43
Brockway	252	185	110	1,404	996	.19	.16
Autocar	221	180	105	1,374	1,157	.18	.18
Pontiac	116	126	21	1,148	274	.15	.04
Federal	170	160	57	933	862	.12	.14
Kenworth	47	66	24	375	271	.05	.04
Crosley	35	45	66	310	694	.04	.11
Sterling	27	33	14	227	159	.03	.03
F.W.D.	27	27	19	208	233	.03	.04
Misc. Domestic	126	108	189	896	2,065	.12	.33
Misc. Foreign	23	18	.....	253	.....	.03	.....
Total—All Makes	126,533	117,040	85,539	754,001	627,631	100.00	100.00

*—Data from R. L. Polk & Co.

Death Takes Widow of Henry Ford

Mrs. Clara Bryant Ford, widow of Henry Ford, died in Detroit Sept. 29. She was 84 years old. She had been ill for some time suffering from a heart condition and had not been in good health generally since her husband died two years ago. At the time of her death she held 6043 shares of the Class B voting stock of the Ford Motor Co., or 3½ per cent of the total of 172,645 shares.

Ford Manufacturing Set-up Put Under Six Divisions

In line with its continuing policy of reorganization, Ford has created six new manufacturing divisions, and has promoted John Dykstra, manager of the old general manufacturing division, to vice president of the manufacturing group to head the new division. Under the new set-up, six separate divisions have been established under the new manufacturing group which replaces the general manufacturing division. They are: Aircraft Engine div, Chicago; Automatic Transmission div., Cincinnati; Canton Forge div., Canton, O.; and the Highland Park, Mound Road, and Tractor and Industrial Engine divisions in the Detroit area. Executives to head the new divisions are as follows: Maynard T. Murray, Aircraft div.; Marvin L. Katke, Automatic Transmission div.; Burton O. Heinrich, Canton Forge div.; Edgar F. Wait, Highland Park div.; K. J. Puffer, Mound Road div.; and David W. Lee, Tractor and Industrial Engine div.

Mack Names Kelso Vice President

A. R. Kelso has been elected vice president of Mack Trucks, Inc., and vice president and director of Mack Manufacturing Corp. Mr. Kelso will be in charge of manufacturing and production at all plants.

Plated Trim Parts May Be First War Casualty

Although steel heads the list of scarce materials, primarily because it is used in such large quantities in automobile production, nickel, chrome, and chromic acid are critically short and bright work on new automobiles will probably be the first casualty. One large company reports that after the first of the year these materials will be so short that there will not be enough to chrome plate all parts that now are plated.

INDUSTRIES

Chrysler Starts Building Indiana Parts Plant

Chrysler Corp. has started construction of a new parts plant just outside Indianapolis to be operated by the Dodge division. The 650,000 sq ft plant, measuring 1020 by 640 ft, is to be built on a 105-acre site and is understood to involve the expenditure of between $6 million and $7 million. Chrysler has not officially announced what particular item will be built there, but it is understood that it will be a transmission plant. Employment is expected to approximate 5000 persons. Chrysler is also expanding its operations at New Castle, Ind., at a cost of approximately $1 million. A new building 80 by 125 ft will be put up for use as a press operation. Also the die department is being enlarged 50 per cent through a 50 by 300 ft addition to the present building.

Ford Starts Operating New Steel Plant

The Ford Motor Co.'s giant $35 million pressed steel plant in Buffalo, N. Y., has begun initial operations. First operations are on a small scale, but will pick up gradually, and plant operations will reportedly be at about 60 per cent of capacity next spring.

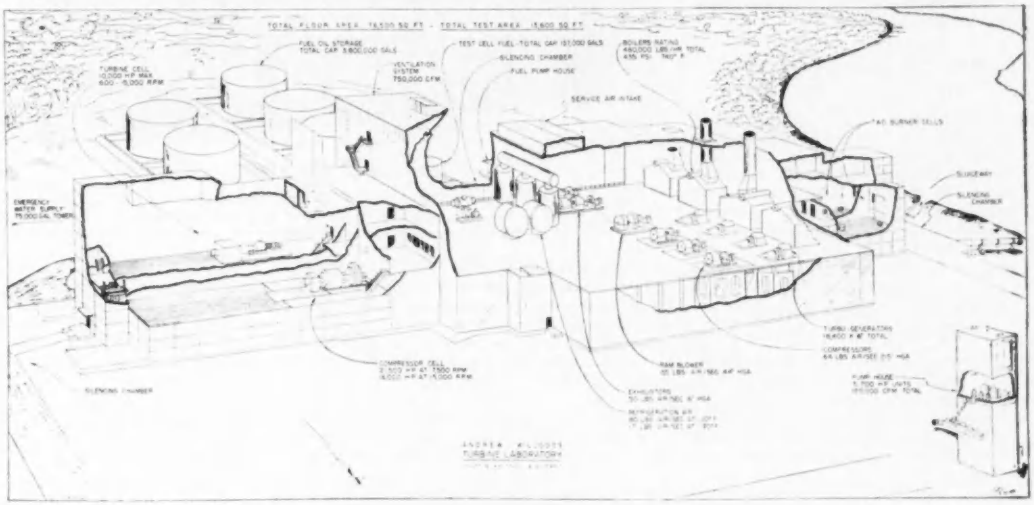
A $5.5 million expansion of power facilities by the Ford Motor Co. of Canada at Windsor, Canada, has been started. A new steam boiler is expected to be in operation next June, and a 25,000-kilowatt turbo-generator will be installed in 1952. They will be housed in a new building adjoining the present power plant.

Show Ordnance Materiel at Aberdeen

Numerous automotive executives and engineers were among the thousands of representatives from industry and Government at the Aberdeen Proving Ground of Army Ordnance in Maryland on Oct. 5 for a full day of demonstrations of the latest Ordnance materiel produced for the Armed Forces by American industry. The event was the 32nd annual meeting of the American Ordnance Association with over 4000 members in attendance. Prominent among the equipment demonstrated were vehicles produced by the automobile industry, including cargo tractors of five to 15-ton capacities, cross country carriers, light and medium military trucks, heavy duty trucks up to 25-ton capacity, light and medium tanks.

Ethyl Completes Gasoline Price-Quality Study

Despite increases in gasoline prices over the past several years, the price per gallon excluding taxes is about the same as it was 25 years ago. Ethyl Corp. has completed an exhaustive study of quality and price of today's fuels as compared with those of a quarter century ago. The study shows price differentials between regular grade gasoline between July 1, 1925 and the same date this year as follows: cargo lots at Gulf Coast refiners, 2.9 cents lower; average dealer price, 4.2 cents lower; average retail price, excluding taxes (for 50 cities) 1.8 cents lower; and average retail price, including taxes, 2.7 cents higher. However, current gasoline according to the study gives about 50 per cent greater value per gallon than the gasoline sold in 1925 in performance, economy, and ton mileage. Octane rating a quarter century ago averaged about 55 compared with the average of 83 today. The report acknowledges that a large measure of the increased value in gasoline is due to advances in engine design, including a jump of compression ratio in the 25 years from an average of 4.4 to 7.1. As compression ratios increased the octane rating of both regular and pre-



NOW IN OPERATION

Built at a cost of $12 million by the Pratt & Whitney Aircraft Div., United Aircraft Corp., the Andrew Willgoos Turbine Laboratory, East Hartford, Conn., with power generating capacity up to 80,000 hp, is said to be the largest privately-owned jet research facility in the world. Just going into full operation, it is the latest facility to be added in a group which includes more than 80 stands for testing complete turbine engines or their components and an extensive compressor test laboratory. The Willgoos Laboratory will have an air pumping capacity of 25,000 hp. The facilities of the new laboratory will provide means for accelerated development on new turbojet and turboprop engines of Pratt & Whitney's own design.

mium fuels kept pace, with the result that regular gasoline today registers 12 octane numbers better than the premium numbers in 1925.

Gear Makers to Meet in Chicago

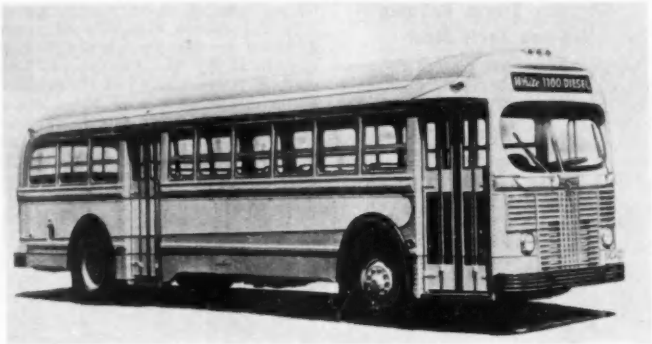
The 1950 semi-annual meeting of the American Gear Manufacturers Association is going to be held in Chicago from Oct. 23rd to the 25th.

New V-8 Engine Scheduled for Chrysler Line Only

Despite many rumors about Chrysler's plans for V-8 engines in DeSoto and Dodge as well as Chrysler for 1951, the best bet still is that the overhead valve V-8 engine will be used only in the Chrysler line. Activity has been stepped up on development of such an engine for DeSoto and Dodge, but it will not be ready for 1951 models.

Ford Foundation Expands Human Relations Study

Trustees of the Ford Foundation have revealed the outline for a vast new program in the field of human relations. The Foundation, founded in 1936 by the late Edsel B. Ford, will pledge support to activities that contribute to world peace and the establishment of a world order of law and justice; that would assure greater allegiance to the basic principles of freedom and democracy; that would advance the well being of people throughout the world; that would strengthen, expand, and improve the educational system to promote a fuller realization of individual, intellectual, civic and spiritual potentialties, and scientific activities that would increase knowledge of factors influencing human behavior. Assets of the Foundation currently include more than three million shares of non-voting class A Ford Motor Co. stock with a current book value of more than $283 million, and other tangible assets totaling several million dollars.



LATEST IN THE LINE

The White Motor Co.'s new 1100 Diesel bus, shown here, is equipped with a Cummins six-cyl, 200-hp engine. In announcing the new line of large capacity coaches, White stresses their economical maintenance and lower fuel cost.

Civilian Aircraft Speeds to be Read in Knots

The Civil Aeronautics Administration has ruled that starting July 1, 1952, speed of aircraft will be officially registered in knots rather than in miles per hour. The principal reason for the ruling is to bring speed computing systems for civilian aircraft into harmony with the knot system adopted by military forces as standard as far back as 1946. The CAA says that a uniform system has become necessary so that military and civilian aircraft can utilize electronic navigation devices now being developed.

Cincinnati Milling Expands Operations

Three expansion programs have been announced by the Cincinnati Milling Machine Co. The Carlisle Chemical Works, Inc., a subsidiary of Cincinnati Milling, is moving into its new plant at Reading, O., and Carlisle expects to have all units in operation this fall. A new division, Cincinnati Milling Products Div., is now selling the new Cincinnati grinding wheels as well as Cimcool cutting fluid, which are made in a new plant, completed in May, 1949, and now being enlarged. The company is also going to build a new plant on a site just outside Wilmington, O.

DEVELOPED FOR THE DEMONSTRATOR

The Twin Coach Co., Kent, O., has announced the development of propane fuel trailer units to operate in conjunction with Twin Coach propane demonstrator buses. Trailers designed and built to Twin Coach specifications by Parkhill-Wade, Los Angeles consulting and construction engineers, consist of individual 500-gal tanks designed under ASME code for 250 lb working pressure, mounted on heavy-duty trailers.

INDUSTRIES

Int'l Car Show in Italy in April, 1951

The National Association of the Motor and Allied Industries has announced that the 33rd International Motor Show will be held in Turin, Italy, from April 4th to 15th, 1951.

Steel, Aluminum, Magnesium Prices Start Upward

The expected increase in steel prices got under way the first of this month when Sharon Steel Corp. raised prices on most of its steel products an average of five per cent. Price increases were: $5 a ton on hot rolled strip and sheet; about $7 a ton on cold rolled strip; $5 a ton on plates; and $10 a ton on hot rolled alloy grades. Previously, the Aluminum Co. of America increased its prices an average of eight per cent on pig aluminum. On Sept. 30 Dow Chemical Co. jumped the price of magnesium products by two cents a pound on primary ingots; three cents a pound on sticks and turnings; and three cents a pound on alloy ingots.

North American to Operate Aircraft Plant in Ohio

Under an agreement with the U. S. Navy, the operation of the government-owned aircraft plant in Columbus, O, will be taken over by North American Aviation, Inc. The plant has been operated since early in World War II by the Curtiss-Wright Corp., and the Curtiss company recently announced that it would cease operations in the plant next April.

Tinnerman Products Plant Nears Completion

Tinnerman Products, Inc., has nearly completed a new plant on a 32-acre site in a Cleveland suburb. The new plant has 150,000 sq ft of floor space, and when in full operation will double the company's production capacity for speed nuts and speed clips.

Ford Given Control of Tucker Plant

The Ford Motor Co. has obtained control of the huge Dodge Chicago plant used for aircraft engine production during World War II, and occupied by the Tucker Corp. after the war. Ford will use the plant for production of 28-cyl aircraft engines for use by Air Force in B-36 bombers. Tooling for production of the engines will take several months, however.

GM Shareholders Approve Two-for-One Stock Split

Stockholders of GM have ratified a two-for-one split of the common stock. GM will thus have the most widespread capitalization of any company in the country with more than 88 million shares outstanding. An interesting note is that the number of authorized shares of common stock has been increased to 150 million leaving nearly 62 million shares still available to be issued in case of need and to be distributed under the bonus plan.

GM President Awarded ASM Research Medal

C. E. Wilson, president of GM, will receive the 1950 medal for the advancement of research given annually by the American Society of Metals. The presentation will be made at the society's annual meeting in Chicago, Oct. 26. Mr. Wilson is the eighth recipient of the award.

K-F Builds First Car in Oregon Plant

Kaiser-Frazer has completed production of the first car at its Portland, Ore., assembly plant. The Portland operation is the first of several small assembly plants throughout the country planned by K-F. On a two-shift operation, it will turn out 22 cars a day with components shipped from Willow Run.

Machine Tool Orders Continue to Climb

Orders for new machine tools continue their sharp upward climb with the August index standing at 307.3, compared with 253.1 in July and 51.5 the same month a year ago. In computing the index, average yearly shipments for the three years 1945 through 1947 is considered as a base of 100. Orders from foreign buyers are also up, but not in as great a proportion.

Graham-Paige Drops Link With Car Industry

Graham-Paige once a prominent name in the automotive industries has lost its last connection with the automobile field. It has changed its name from Graham-Paige Motors Corp. to Graham-Paige Corp. to reflect its change to an investment company.

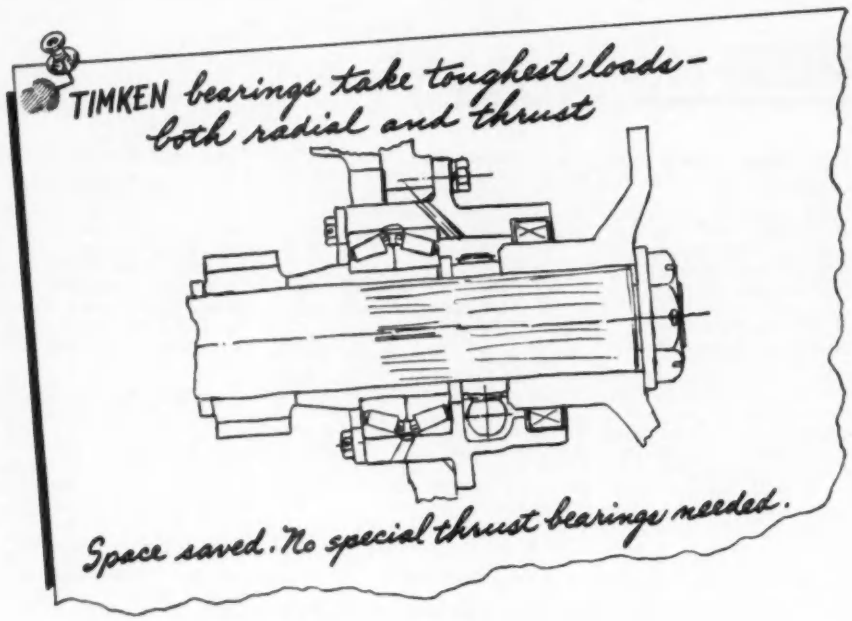
Court Authorizes Auction of Tucker Corp. Assets

The Federal Court in Chicago has authorized a three-day auction to dispose of about $2.5 million worth of assets of the defunct Tucker Corp. The sale begins Oct. 18 at the government-owned plant formerly occupied by Tucker.

REGIONAL SALES OF NEW PASSENGER CARS

Zone	Region	August 1950	July 1950	August 1949	Eight Months 1950	Eight Months 1949	Per Cent Change: Aug. over July	Aug. over Aug. 1949	Eight Months 1950 over 1949
1	New England	32,962	41,178	27,142	233,978	181,494	−19.95	+21.44	+28.92
2	Middle Atlantic	124,784	117,180	94,6 8	779,554	594,897	+ 6.49	+31.88	+31.04
3	South Atlantic	77,073	70,305	54,950	489,535	352,550	+ 9.63	+40.26	+38.85
4	East North Central	173,345	142,259	123,036	1,0 6,345	794,511	+21.85	+40.89	+27.92
5	East South Central	29,799	32,686	22,532	2'3,555	152,818	− 8.83	+32.75	+39.74
6	West North Central	64,485	67,252	51,782	427,525	323,447	− 4.12	+24.53	+32.18
7	West South Central	77,157	61,573	42,2'3	388,675	254,688	+25.31	+82.78	+52.61
8	Mountain	24,493	25,290	17,336	148,252	105,052	− 3.15	+41.28	+41.12
9	Pacific	79,897	92,203	44,947	426,438	329,184	+53.05	+77.76	+29.54
	Total—United States	683,995	609,926	478,556	4,123,858	3,088,649	+12.14	+42.93	+33.52

States comprising the various regions are:—Zone 1; Conn., Me., Mass., N. H., R. I., Vt.—Zone 2; N. J., N. Y., Pa.—Zone 3; Del., D. of C., Fla., Ga., Md., N. C., S. C., Va., W. Va.—Zone 4; Ill., Ind., Mich., Ohio, Wisc.—Zone 5; Ala., Ky., Miss., Tenn.—Zone 6; Iowa, Kan., Minn., Mo., Neb., N. D., S. D.—Zone 7; Ark., La., Okla., Tex.—Zone 8; Ariz., Colo., Ida., Mont., Nev., N. M., Utah, Wyo.—Zone 9; Cal., Ore., Wash.



What tip can you get from pinions that might help your new transmission?

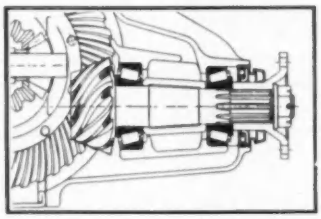
As an automobile man, you know that the toughest bearing job in the entire industry is the pinion. And here's a significant fact: Today all but two American cars use Timken® tapered roller bearings in this important location!

Why? Because of their ability to take both heavy radial and thrust loads, Timken bearings not only stand up better than other bearings, but also keep the pinion and ring gear meshing smoothly and transmitting power quietly.

What's the tip for you if you're designing a new transmission?

Simply this—no matter how you plan to convert power, Timken bearings offer a *proved* way to assure long and trouble-free life under the toughest conditions of operation.

And that's only half the story! Because Timken bearings carry both radial and thrust loads, separate thrust washers or bearings are not needed. Space is saved. Line contact between the rolls and races holds shafts rigid. End play is eliminated. As a result, closer clearances between revolving parts are possible without danger of interference. And since Timken bearings can be taken up during assembly, tolerances of surrounding parts can be greater, designs simplified.



All but two cars use Timken bearings on the pinion. Here's a typical application.

For assistance in planning your bearing applications, feel free to call on our engineering facilities. In Detroit, phone TRinity 5-1380. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

NOTE TO P. A.'S. *Because every step of the manufacture of Timken bearings is controlled within our company...because our vast manufacturing facilities are widely dispersed... you will find The Timken Roller Bearing Company a supply source of outstanding reliability.*

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ⊂⊃ THE TIMKEN TAPERED ROLLER ⊂⊃ BEARING TAKES RADIAL ↓ AND THRUST →○← LOADS OR ANY COMBINATION →✳←

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers.

CALENDAR

OF COMING SHOWS AND MEETINGS

Conventions and Meetings

SAE Nat'l Transportation Mtg., New York City .....Oct. 16-18

Nat'l Safety Congress, Chicago..Oct. 16-20

Society of the Plastics Industry Nat'l Conference, Swampscott, Mass. Oct. 18-20

British Passenger Car Show, London, Oct. 18-28

Amer. Society for Metals' Annual Nat'l Metal Congress & Exhibition, Chicago .....Oct. 23-27

Amer. Welding Soc. Annual Mtg., Chicago .....Oct. 23-27

Nat'l Lub. Grease Inst., Chicago, Oct. 30-Nov. 1

Amer. Soc. Body Engrs. Technical Convention, Detroit .....Nov. 1-3

Ind. Management Soc. Management Clinic, Chicago .....Nov. 2-3

American Petroleum Institute Annual Mtg., Los Angeles .....Nov. 13-16

1st Annual "Motorama," Los Angeles .....Nov. 16-19

Power & Mech. Engineering Exposition, New York City ...Nov. 27-Dec. 2

Nat'l Standard Parts Assoc. Convention, Chicago .....Dec. 1-2

Auto. Service Industries Show, Chicago .....Dec. 4-8

SAE Annual Mfg. & Engineering Display, Detroit .....Jan. 8-12

Nat'l Assoc. Engine & Boat Mfrs. Nat'l Motor Boat Show, New York City .....Jan. 12-20

Plant Maint. Show & Conf., Cleveland .....Jan. 15-18

Soc. of Plastic Engrs., New York City .....Jan. 18-20

4th Annual Hot Rod and Motor Sports Show, Los Angeles ..Jan. 25-28

Inst. of the Aeronautical Sciences, New York City .....Jan. 29-31

Nat'l Auto. Accessory Mfrs. Assoc., New York .....Feb. 5-8

International Auto Salon, Geneva Mar. 8-18

Amer. Soc. Tool Engrs., New York City .....Mar. 17

Pacific Automotive Show, Seattle Mar. 21-24

Salone Internazionale Dell Automobile, Turin, Italy .....Apr. 4-15

Amer. Soc. Lubricating Engrs., Phila. .....Apr. 16-18

Amer. Mat. Assoc., Nat'l Packaging Expos., Atlantic City .....Apr. 17-20

A.E.R.A. Convention, Chicago ....May 7-9

Nat'l Air Races, Cleveland Airport May 19-20

Amer. Society for Quality Control, Cleveland .....May 23-24

The Electric Auto-Lite Co.—**H. E. Hasemeyer** has been promoted to the post of Asst. Production Manager.

Mack Trucks, Inc.—**A. R. Kelso** has been elected Vice-President of the company and, at the same time he was named Vice-President and a director of Mack Mfg. Corp., a wholly owned manufacturing subsidiary.

Ford Motor Co.—**L. W. Smead** has been promoted to General Sales Manager, Ford Div.

The White Motor Co.—**Wyman L. Henry** has been named Sales Manager of the "3000" Div. **J. R. Munro** has been appointed to the newly-created position of director of manufacturing; **C. A. Woodley** has been named General Factory Manager; **W. L. Naumann** and **Lloyd J. Ely** have been appointed assistant general factory managers.

Ford Motor Co.—**Maynard T. Murray** has been appointed general manager of the Aircraft Engine Div.

American Brake Shoe Co.—**Ralph L. Robinson** has been named vice president of the Brake Shoe and Castings and Southern Wheel Div. with headquarters in Chicago. **Edward R. Anderson** becomes vice president of the Brake Shoe and Castings Div. His headquarters is San Francisco.

The Electric Auto-Lite Co.—**Irwin B. Hayes** has been named manager of the Stickney Avenue plant in Toledo.

Lempco Automotive, Inc. — **Stanley Kinkor** has been named vice president and general sales manager of the company, a subsidiary of Lempco Products, Inc.

Mack Manufacturing Corp. — **S. S. Stewart** has been named Vice-President in charge of Purchasing.

Acheson Colloids Corp. — Announcement of the appointment of **Paul L. Eness** to the staff of the Product Development Laboratory, has been made.

Harrison Radiator Div., General Motors—The appointment of **Bernard I. Raysor** as manager of the Radiator plant has been announced. He succeeds **Mr. B. L. Howe.**

National Automotive Fibres, Inc.—**Harvey B. Greens,** assistant to the president, has been elected to the post of assistant secretary and assistant treasurer.

Curtiss-Wright Corp.—The appointment of **Charles W. Frick** as Works Manager, Muskegon, propeller div.

Detroit Diesel Engine Div., General Motors—The promotion of **R. D. Redner** to Sales Representative of the Division has been announced.

The Hydraulic Press Mfg. Co.—**William A. Bohlander** has been appointed factory manager.

The Budd Co.—The resignation of **Warren H. Farr,** Vice-President in charge of Manufacturing has been announced.

Thermoid Company—**George S. Lamson,** Manager of the Automotive Replacement Division of the Company, has been elected Vice-President.

American Brake Shoe Co.—**Fred P. Biggs** has been appointed president of the Brake Shoe and Castings Division and **Stephen S. Conway** has been appointed vice president in charge of sales of the Southern Wheel Div. of the Brake Shoe and Castings Div.

White Motor Co.—**Karl A. Roesch** has been named Asst. Wholesale Manager of the company's National Sales Staff.

The Atlas Mineral Products Co.—The

(*Turn to page* 78, *please*)

Necrology

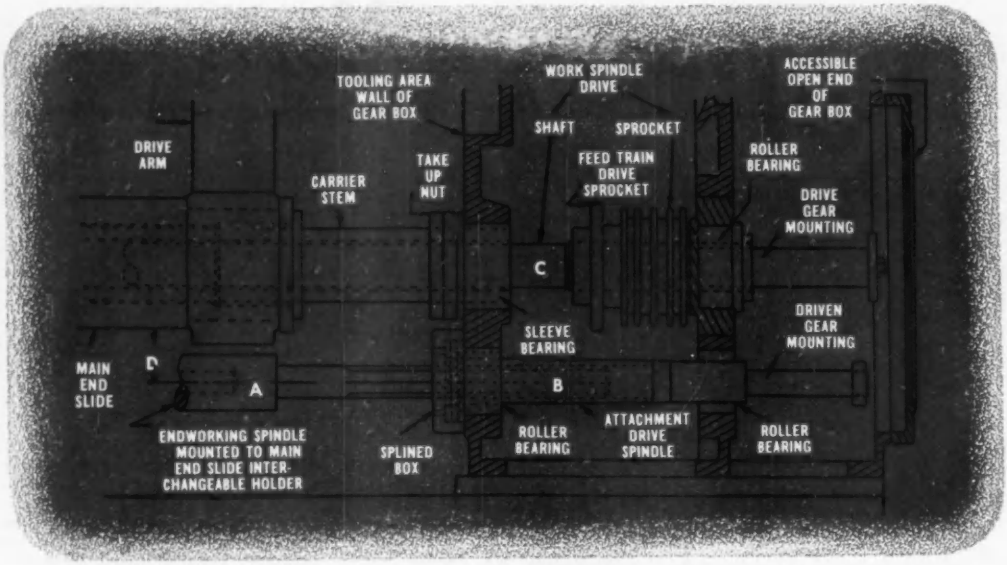
Charles E. Monahan, 52, purchasing agent, Budd Co., died recently in Detroit.

Joseph A. Horne, 81, chairman of the board of directors, Yale & Towne Manufacturing Co., died in Stamford, Conn., on Oct. 3.

George S. Brintnell, 86, founder of the Brintnell Motor Car Co. in 1908, which made the Gray Dort, Tudhope and Guy cars in Canada, died in Toronto, Canada, on Sept. 21.

A. Oakleigh Bush, chief sales engineer, Abrasive Div of the Norton Co., Worcester, Mass., died on Sept. 2.

William R. Reid, 71, chairman of the board, the Torrington Co., died Sept. 16, at Torrington, Conn.



BEWARE OF THE BAR IN BARGAIN

With manufacturing costs much the same the country over, the purchase prices of various brands of a given type of machine tool should be about equal for equal value. Healthy competition tends to level out prices.

All of the best facilities of the highest priced machine may not be needed, and should not be expected of the lowest priced machine. The value of any brand depends on how well its facilities meet the particular needs of the individual plant.

Of all required facilities, those of low-cost operation and maintenance are universally considered important. A machine without them is a BAR to any GAIN at any PRICE.

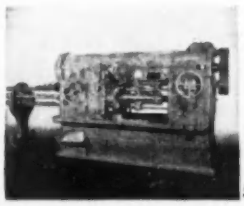
An example of **LOW-COST OPERATION AND MAINTENANCE FACILITY** is the **EXCLUSIVE** Conomatic **"ALL POSITION" END ATTACHMENT,** which has:

1. **Direct Drive to ANY Rotating Tool, in ANY or ALL SIX, Main End Slide Positions. Solid Tapping in ANY THREE Positions on ONE Set-up. Die Head Swing, D, clears COLLET CAPACITY in ANY Position.**

The above drawing shows Endworking Spindle, A, in a Main End Slide Position of a 1½" SIX SPINDLE Conomatic. Its splined shaft is rotated by the Attachment Drive Spindle, B. The drive from the Work Spindle Drive Shaft, C, is indicated. The Spindle, A, rotates in its bearing in an interchangeable Holder mounted to the Main End Slide, whose travel it may take. Three levers and cams offer independent travel to any three Endworking Spindles per single set-up.

2. **Accessible OPEN-END Application and INTERCHANGEABLE Attachment HOLDERS. Selective Speeds and Feeds.**

Six Attachment Drive Spindles may be applied to one set-up. Two are machine equipment. There is drive facility for 168 Speeds between 132 and 6158 RPM for drilling, boring, etc. Std. Drive Gears offer 10 Threading Speed Ratios.

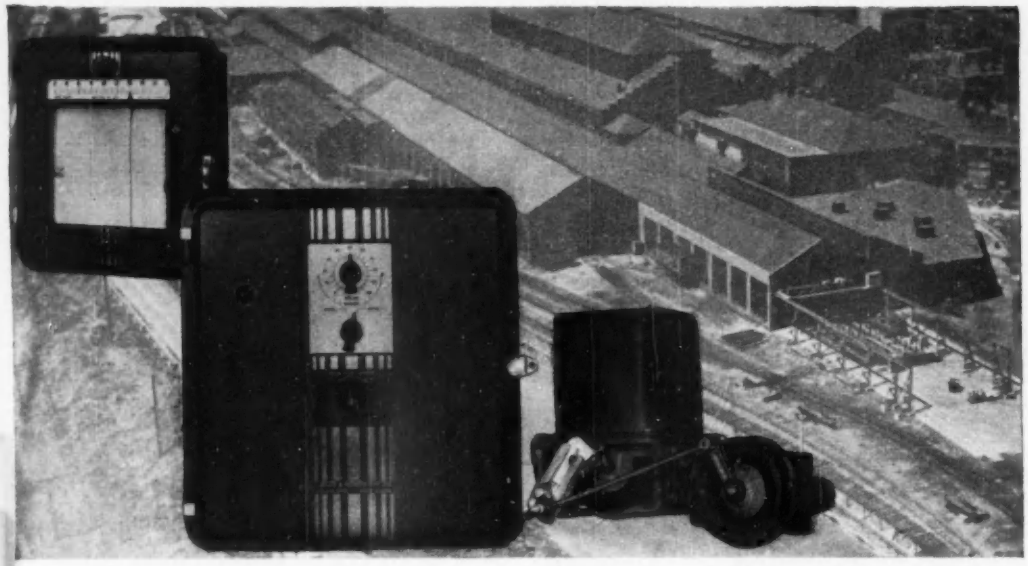


Buyer's Comparison Chart will guide you to full information

A Comparison of ALL Automatics is in Favor of Cone

Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.



Major Advance in Electric Control Increases Production From Industrial Operations

With production demands reaching toward fresh all-time highs, this new P.A.T.'50 Control comes at the ideal time to help thousands of firms increase the output of their industrial furnaces. Here's why:

This Control has something that's brand new. It acts on the *speed* of swings in furnace load, as well as on their size and permanence. Thus, if temperature changes gently, it is gently nudged back into line. But if it starts off briskly—as when the furnace door is opened—P.A.T.'50 reacts briskly. The faster the change, the further P.A.T.'50 moves the fuel valve. Then, at the instant this action begins to head off the change, the Control starts backing away. By putting on the brakes it brings temperature back in line smoothly, rapidly.

This "Rate Action" increases production because it reduces the length of time a furnace is off temperature. It means more heats per week.

P.A.T.'50 is the Only electric positioning control with Rate Action. It's a unique L&N contribution to automatic regulation.

Also, Proportioning and Reset Actions are more responsive than before. These two components have always been vital to automatic control, and of course continue so. They stop the normal, every-day temperature swings which are started by changes in the size and permanence of the furnace load.

When we gave P.A.T. its third component of rate action—and introduced it in this '50 model—we were able also to increase the sensitivity and range of adjustment of proportioning and reset components. The resulting improvement in control action shows up at all times, but especially when temperature is being stubborn—trying to edge away from the control point, or to level off incorrectly. Even without rate action, P.A.T.'50 would do a better-than-ever job. But with rate action, results are far superior to any previous electric control.

The News is in the Control Unit. Everything new in P.A.T.'50 is in the Control Unit—the device in center of above illustration which is usually mounted below the Speedomax or Micromax Recording Controller, and which links that instrument to the fuel-valve-driving mechanism. In line with our policy of making improvements readily available to users of our equipment, earlier installations of P.A.T. Control can be converted to P.A.T.'50 by replacing the Unit and making slight changes in the Controller. The new Unit is fully electronic—has no moving parts except two hermetically-sealed relays.

For complete details, contact our nearest office, or write us at 4966 Stenton Ave., Philadelphia 44, Pa.

MEASURING INSTRUMENTS · TELEMETERS · AUTOMATIC CONTROLS · HEAT-TREATING FURNACES

LEEDS & NORTHRUP CO.

Jel. Ad ND4 33(1)

increased production with

Surface Broaching

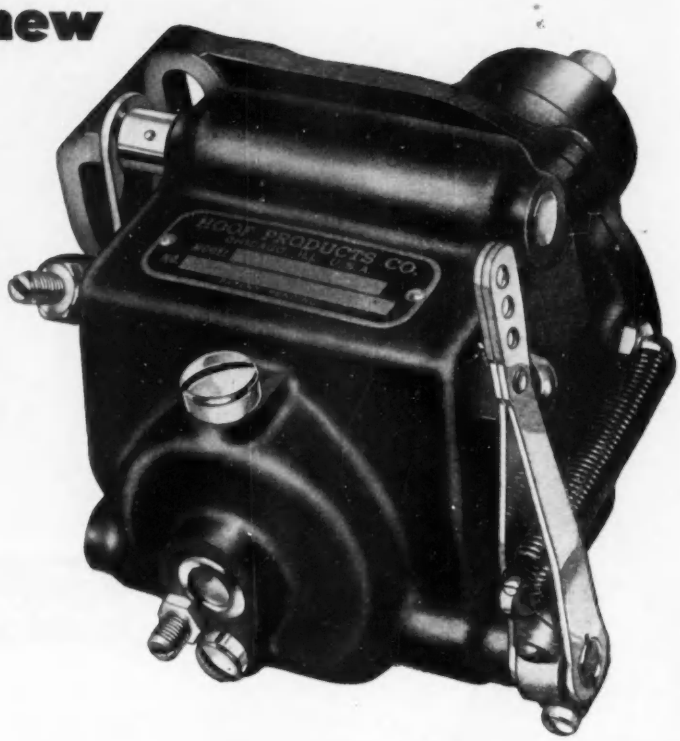
● We suggest that you investigate now the advantages of surface broaching for the machining of parts like these in the illustrations. Hundreds of similar parts in plants thruout the metal working industry are now being surface broached on *Footburt Continuous Type Machines:* faster, more economically, to closer limits.

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio
Detroit Office: General Motors Building

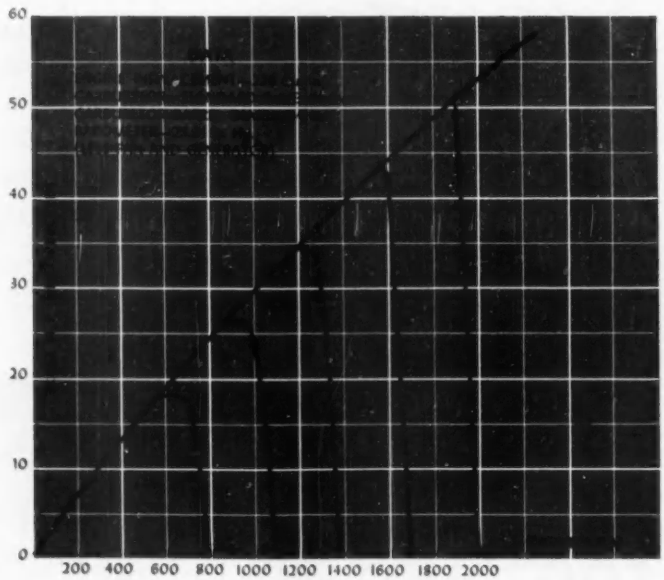
INVESTIGATE
Surface Broaching
FOR DIFFICULT MACHINING WORK

FOOTBURT SURFACE BROACHING
ENGINEERED FOR PRODUCTION

This is the new HOOF Mechanical Governor



This is the Performance Graph



CORRESPONDENCE IS INVITED

HOOF PRODUCTS COMPANY

6543 South Laramie Avenue, Chicago 38, Illinois

GOVERNORS • VELOCITY AND CENTRIFUGAL TYPES • HYDRAULIC VALVES FOR AIRCRAFT

How Thin Can a Head Gasket Be for High Compression Sealing?

VIC-2-FOLD

TRADE MARK

The Thinnest Practical Metal-Asbestos Construction . . . Compressible to .040 Average

Fully effective on Valve-in-head or L-head engines

With VIC-2-FOLD gaskets, you can meet the exacting requirements of modern high-compression engine head sealing. VIC-2-FOLD is the thinnest practical construction for a compressible metal-encased asbestos gasket. On the engine, it compresses to .040" average.

VIC-2-FOLD design combines the high breakdown resistance of steel and the corrosion-resistance of copper. The overlap forming of the VIC-2-FOLD gasket case, as detailed at right, takes maximum advantage of each of these metals.

Superior General Purpose Gasket at Moderate Cost

Not only does VIC-2-FOLD excel standard gasket construction for flexibility, but has adequate compressibility for positive sealing in all applications. Thorough dynamometer testing shows that VIC-2-FOLD has all desirable features of a general purpose gasket, and is equally suited for Valve-in-head or L-head engines, in gasoline or diesel service.

Complete Technical Data Supplied on Request

Ask your Victor Field Engineer to give you the full details on VIC-2-FOLD gaskets. No obligation. Or, if you prefer, send your inquiry direct to the Engineering Dept., Victor Mfg. & Gasket Co., P. O. Box 1333, Chicago 90, Ill.

Section across combustion opening showing the VIC-2-FOLD construction

Note how bottom layer of steel is formed up in combustion chamber openings, and overlaps asbestos filler and top layer of copper, thereby utilizing the high strength of steel against breakdowns and blowouts.

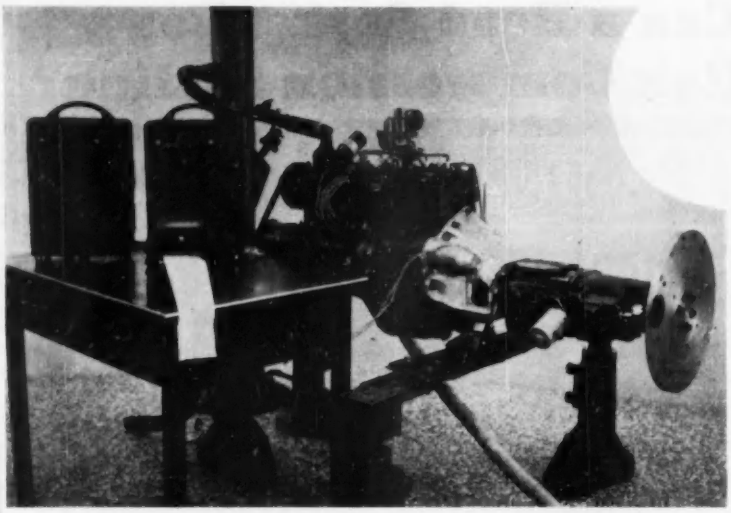
Similarly in coolant openings, the top layer of copper is formed down and overlaps the asbestos filler and bottom steel layer. This utilizes the high corrosion resistance of copper in contact with coolants and anti-freeze solutions.

Asbestos filler is of the finest quality, precision milled and composed in Victor's own plant.

SEALING PRODUCTS Exclusively

VICTOR GASKETS AND OIL SEALS

VICTOR



Manner in which dynamic stresses were set up by using an unbalanced weight on a disk at the rear end of the transmission case.

First Die

By Joseph W. Steel
Aluminum Co. of America

THE first stressed aluminum die casting used as a major part of an automobile made its appearance this year in the form of a clutch housing on two complete lines of Nash cars. The final design of the die cast aluminum clutch housing was the direct result of stress analysis tests on various proposed designs under simulated road testing conditions by Aluminum Co. of America at its Cleveland Development Division Laboratories and augmented by actual road tests at the Nash proving grounds. The methods used in working out this design may be used in the design of aluminum die castings for other automotive uses.

In the past, standard automobile clutch housings have usually been of cast iron, but over a year ago Nash made a switch in the present direction. At that time, Nash began using on one of its models an aluminum clutch housing made by the permanent mold process.

A preliminary study of the housing by Alcoa die casting and development engineers indicated that an aluminum die casting could be produced with satisfactory shape combined with adequate fatigue and static strengths. Since die casting is a low cost, mass production process well suited to the automotive industry, the major requirement was to achieve a die cast housing with fatigue and static strengths at least as good as those of the previously used aluminum permanent mold housing. Verification of the design by laboratory methods before construction of the expensive die-casting die avoided some delays of initial road testing and of trial and error production methods. So successful were the development engineers that the final, thoroughly tested clutch housing was actually cheaper, stronger, and lighter than other clutch housings previously used by Nash.

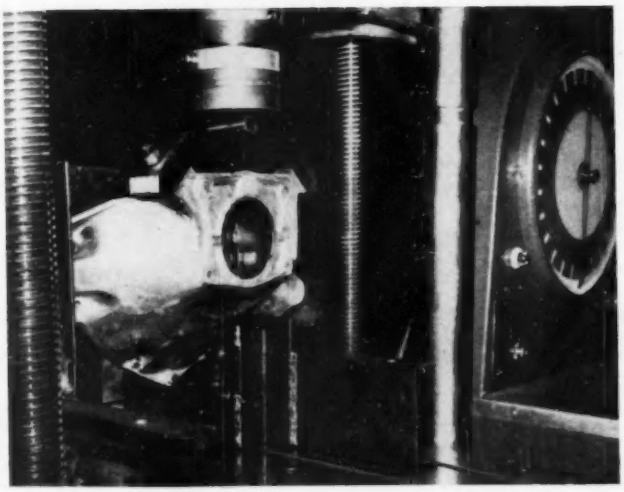


Fig. 1. Setup for shear load static breakdown test with aluminum clutch housing in position.

Clutch Housing of Cast Aluminum

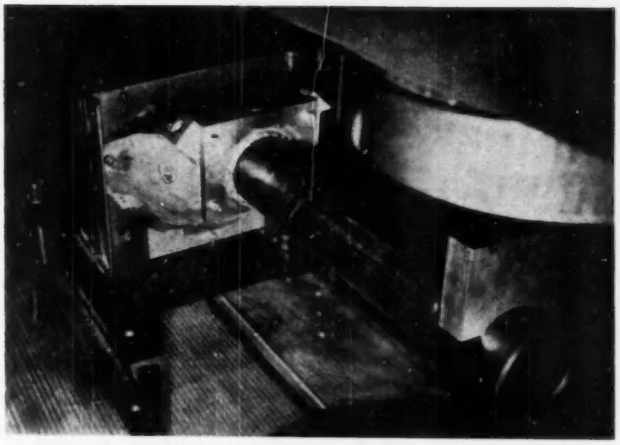


Fig. 2. This illustration shows arrangement for static load breakdown test under a 19-in. arm with the clutch housing in position. Load is applied at approximate location of universal joint.

The general purpose aluminum die casting alloy 380 with good casting characteristics and mechanical properties was selected for this application. Alloy 380 has a nominal composition of 3.5 per cent copper, 8.5 per cent silicon, the rest aluminum.

Mechanical properties of the alloy, as determined from standard round die cast tension test specimens having a reduced section of ¼ in. are:

Tensile strength (psi), 45,000.
Yield strength (psi), 26,000.
Elongation per cent in 2 in., 2.0.
Endurance limit (psi), 20,000.
Shear strength (psi), 29,000.

An analysis of the previously used permanent mold housing was made by using a series of static and dynamic load tests planned to duplicate the loads exerted on the housing in service as established by Nash. This information was used to complete the preliminary design and from this, sample aluminum sand castings were made. These castings were then tested to determine the modifications needed to meet the previously established design factors.

After the experimental aluminum sand casting, made to the die casting design, was assembled to the engine and transmission, static and dynamic load tests as mentioned above were made to establish the location of any critical sections and to indicate the magnitude of the stresses in these locations. With loads applied in both vertical and horizontal directions, Stresscoat, the brittle strain indicating lacquer, was used to locate stressed areas. Stresses at these points

(*Turn to page* 98, *please*)

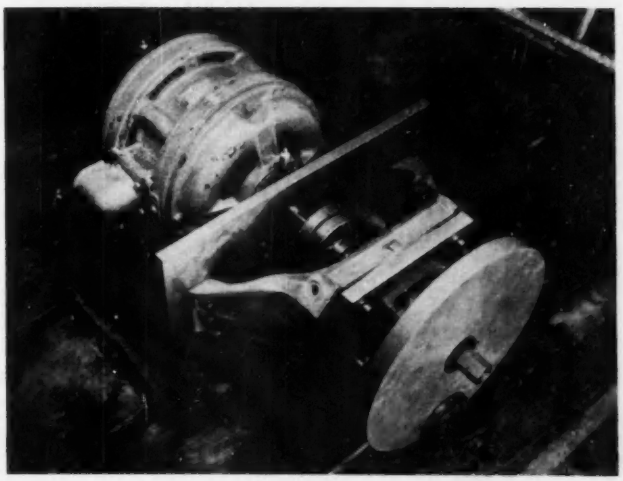


Fig. 3. The fatigue breakdown test based on a 1000-lb eccentric load was made with this setup.

Efficiencies

THE basic problems of an airplane plant are numerous and difficult. To name a few: Engineering must keep abreast of or ahead of the rapidly advancing frontier of new knowledge, and at the same time cope with the constant and maddening compromises between speed and range, weight and strength, speed and maneuverability, etc. Materiel has to obtain the thousands of different kinds of airborne materials, as needed, often from distant sources and with little or, literally, no procurement time scheduled. Manufacturing must meet schedules in spite of an inevitable flow of changes to the product. The fact that parts are, of necessity, made in job lots adds greatly to the problem of adequate production control and cost control.

The degree to which a plant solves these and similar problems and the resultant effect upon elapsed time required and *costs* is the measure of the efficacy or success of a plant.

Following are examples of what we have found to be improved ways of accomplishing the work. Some of the examples are operative in all the Douglas plants; some only in the El Segundo plant. Needless to say, the other plants have methods of their own of which they are equally proud. The specific examples following were chosen because they have fairly general application, and because they are typical of the trend of our methods. Similar economies in engineering, accounting, inspection, and other functions not mentioned are not discussed for space reasons, but do exist.

Plant Layout

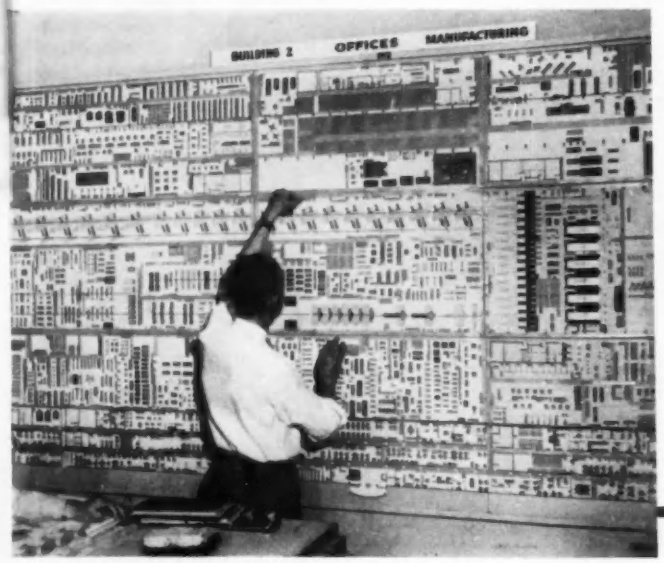
The techniques of analyzing layout problems and distributing layout information have been simplified to the point that two men operate the master layout system. More than one and one-half million sq ft of covered area are involved, with numerous rearrangements required by multi-model production. Here is the way it works:

The master layout, made to a $\frac{1}{8}$ in. scale, consists of the floor plans of all the buildings, mounted on wood panels, which in turn are scaled and become segments of the particular building of which they are a part.

The wood panels are arranged on a wall in their relative location to each other, thus closely approximating a plot plan of the total plant area. Floor plans are reproduced from cloth tracings as blue-line prints. In addition to showing all permanent obstructions and walls, the "base drawings" are divided into 2 ft square cross-sections. This cross-sectioning eliminates measuring and dimensioning. Templates of standard equipment, such as desks, tables, benches, racks, etc., are printed on colored stock in strips. Templates of machinery, jigs, and special equipment are made by hand.

To make a layout, the blue-line print, "base drawing," is stapled to its proper panel. Templates are then assembled, arranged and pinned down with map tacks. After study, discussion and approval of layout, templates are stapled to board.

Layout is next photographed (full scale) and resulting negative is used to produce blueprints which are furnished to maintenance departments and others interested.



Plant layout board. Templates of standard equipment such as desks, benches, etc., are printed in strips. Templates of machines and special equipment are made by hand.

The Douglas Skyraider, said to be America's most powerful attack bomber, can mount 12 five-in. rockets and three 2000-lb bombs, rockets, or torpedoes in attacks from carriers.

in Aircraft Production

by T. E. (Eric) Springer

El Segundo Plant Manager
Douglas Aircraft Company, Inc.

These blueprint "pictures" have various essential uses, i. e., a) Guidance of maintenance departments in making rearrangements and installations; b) Visual guide to locations, functions, and departments; c) Identification of flow lines for parts, assemblies, and finished ships, and location of assemblies and ships in various departments; d) As an aid to estimating and scheduling departments in charting progress of various models.

This system of making layouts was established in 1944 at the El Segundo plant and has been in satisfactory operation ever since.

Combined Planning

Originally the planning organization functioned along specialized, conventional lines; a separate tool planning department planned and ordered tools; while a separate production planning department planned and ordered detail parts and assemblies. This procedure put an onerous coordination burden on the two planning departments, and in general caused their work to proceed in sequence rather than concurrently. The result was a longer than necessary interval between engineering and manufacturing, with some duplication and attendant higher costs.

To correct this the two departments were combined entirely, both physically and in personnel. The individual work of tool planners and production planners was merged so that today a single man does *all* the planning on a given job—tools, assembly, detail parts. Responsibility is accurately fixed, quality of paperwork is superior, the period from engineering completion to first flight is shorter, and planning costs are lower.

Open Binning in Assembly Departments

Open binning permits placing parts in the assembly departments next to the work area requiring them, so that they are available to the workers without need of any formal withdrawal papers and record keeping.

Fabricated and purchased parts are delivered to the proper assembly department. The parts are then placed in open bins and racks so near the jigs that the workers easily obtain what they require. A "cushion," usually two weeks' supply, sealed in bundles, is kept for emergencies in the same bins or racks, usually under the unbundled supply being used. Should the regular unbundled supply of parts become exhausted, the worker breaks the seal, opens the two weeks' cushion reserve supply, and continues work without delay. A red tag attached to the cushion bundle is immediately sent to a system to expedite replenishing of parts in such cases. Over-supply is controlled by a scheduled release of items.

The following advantages revealed in this respect are worthy contributors to economy: No time is lost in moving to and from work areas to the storeroom;

there is no waiting in line at the stockroom; no building up an assembly in a basket; no wrong parts to cause lost time in correction; no peak rush periods for parts; fewer stockroom clerks; the number of missing parts is decreased; with no records of any withdrawals to contend with, countless bookkeeping entries are eliminated. The advantages of this system are patent, but its initial installation requires some education of shop personnel.

Cost Reduction Committee

Some problems fit committee action very well for rapid solution. In this category fall reducing the cost of certain shop operations, when the reduction depends upon making basic changes in the work assignment and work method. Our cost reduction committee, composed of representatives from engineering, inspection, tooling, planning, cost analysis, and the shop, has made notable progress in reducing (by 57 per cent) the amount of hand work in sheet metal fabrication, cutting the costs of drilling, broaching, profiling, etc. To achieve the desired result, concerted actions by engineering (*production* design and tolerance relief), inspection (interpretation of engineering's specifications), tooling and planning (refinements), shop (improved practices, and helping define the problem), are necessary. With each committee member well qualified and empowered to make decisions for his function substantial savings have resulted, with a minimum of friction and difficulty. Engineering has usually supplied the committee chairman.

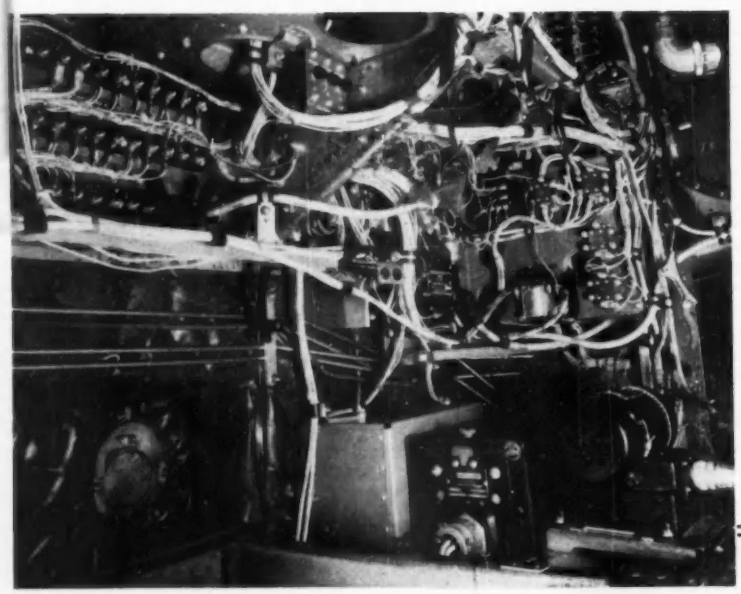
Control of Stock Items

Little things that are used in volume are important too. An item which is used in quantity by a large number of assemblies is classified as a stock item. Examples are nuts, bolts, rivets, screws, washers, etc. A quantitative and qualitative analysis is made of the needs of each shop department; the indicated requirements are placed in drawer-type cabinets strategically located in each department. Deviations from the analyzed need are called to the attention of materiel by shop supervisors. Then these established cabinets are serviced twice a week by materiel on a maximum-minimum basis, with materiel re-ordering on an average-monthly-consumption basis. Neither planning nor the shop are involved in paper work (other than the deviations). Inventory control and accounting records are quite simple, and the volume of records to be processed is small for the huge usage.

The Development Airplane

As soon as the structure of a new model production airplane has been made and assembled, an early production plane is moved off the line into the development slot. Here the final hydraulic and electrical line routing and procedure is worked out and standardized for the balance of the airplanes to be produced.

When the complexity of the hydraulic and electrical systems is studied in the pictures, it is evident that the exact routing and placement can be worked out better on an actual model than on a drawing board. Furthermore, key men from the various production line assemblies can be trained in, and



Exact routing and placement of electrical and hydraulic systems are worked out on an actual model rather than on a drawing board. Wire bundles are then made up on jig boards and hydraulic lines are made up using templates of soft steel rods.

Main body of planning department. Overhead signs denote sections under control of administrative planners to which major portions of the airplane are assigned.

contribute to, the best installation procedure. After it has been determined that the wiring has been routed correctly along the most practical structural surfaces, around corners, through bulkheads at the proper place, and beneath fixed installations, an exact model of this curving path is made on a jig board. Any wire bundle made up on this jig board pattern maker will fit into its exact place on the development plane and consequently will be used on all like production models on the line.

In the same manner, optimum routing for the various hydraulic lines is developed, and Bessemer rod templates are made. From these models, which are duplicates of every curve and formation of the final installation, hydraulic lines are made which fit into exact position in the like production models on the line.

The proper placement of controls, correct installation procedure for heat vents, and numerous other production installation refinements are worked out in this development airplane. Photographs and final engineering drawings are made when the work is completed. These are given to the various production line personnel concerned for use in the subsequent activities. The savings accomplished by this shop engineering are substantial.

"Quick Fix"

Quick Fix is a system set up at Douglas El Segundo to accomplish the handling of mandatory changes which would normally cause delay on the production line if handled by regular production methods. It is a group established in the experimental section that fabricates parts and makes assemblies and installations by short-cutting most of the normal production channels until such time as these changes can be integrated into the regular production flow. Quick Fix orders have top priority and are personally handled through all rough spots.

The change control department, prior to engineering release, determines in conjunction with department heads affected, those changes to be handled by the Quick Fix group as demanded by the production schedule until the change can be integrated into regular production channels. Change control notes the number of airplanes to be handled by Quick Fix. These airplanes are released by the Quick Fix planner to the Quick Fix group. The Quick Fix group then fabricates parts and makes installations by short-cutting most of the regular production channels and use of top priority orders. Parts are often fabricated without production tooling, which is not available at this stage. Quick Fix often farms out work to other departments if they are equipped to handle the job. It closely follows the work through these other departments, and employs many trouble-shooting methods.

Installations are started at the point where the change takes effect, and at the earliest possible point in

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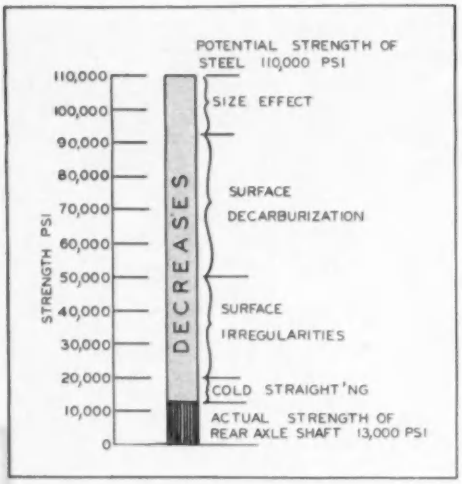

Fig. 1—While the potential strength of the material, as determined from specimen testing, is 110,000 psi, the actual strength of the axle shaft is only 13,000 psi. Note the four factors responsible for this decrease.

Materials

THE past 10 or 15 years have seen a major change in our way of thinking concerning the meaning and usefulness of materials testing methods. In the past, the problem of selecting material was based on a series of conventional tests, in which specimens of a standardized form were subjected to tensile, impact, fatigue, etc., tests. These data were then projected in design, with a tacit understanding that they provide a measure of the behavior of the material in actual service application.

By now it is recognized that information based on such tests is not only inadequate but may be entirely misleading. One instance is given by Keller[1] who says that fuel oil pump bodies have given much worry through mysterious failure. They were made in several classes of steel, from 56,000 to 116,000 psi. He says, ". . . and it is a peculair fact that the higher the tensile the quicker the bodies failed." It was subsequently found that failure started from a protruding corner formed by the intersection of two holes which, acting as a notch, affected deleteriously the high strength steel.

Rowe[1] quotes the failure of 0.40 per cent carbon gears in two years, and of much stronger case hardened gears in only a few months. Service conditions were the same in both cases and they apparently involved lack of alignment which brought concentration of stress in the teeth. The resultant high stresses were dissipated earlier in milder steel, thus producing a higher life.

Notice how much at variance these results are from data obtained from a conventional specimen testing, where higher tensile strength usually implies better performance in service.

The reason for the unreliability of specimen testing lies in the fact that it reflects the *potential* capacity of the material rather than its *service* usefulness. This is illustrated in Fig. 1, where the actual strength of a rear axle shaft was found to be only one-eighth of the potential capacity of the material! A design based on specimen data would have to include a factor of safety of eight to hide our ignorance as to the true strength of the material. It is not surprising, therefore, that H. W. Gillett of the Battelle Memorial Institute characterizes specimen testing as a process of getting "the minimum amount of information for the maximum amount of effort."

The approach taken nowadays is that the true worth of the material is reflected only in tests on actual fab-

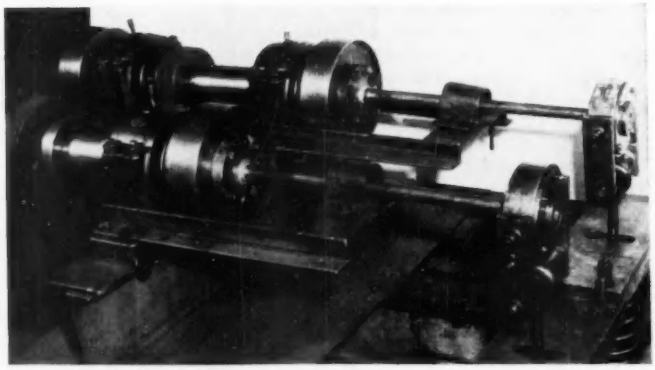

Fig. 2—Fatigue machine for testing rear axle shafts (Timken Roller Bearing Co.)

Data

That Are Significant to the Designer

By Charles Lipson
Consultant

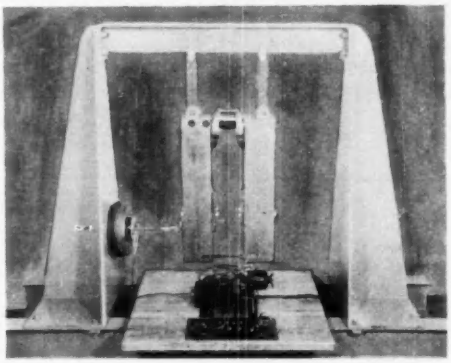

Fig. 3—Early model of a fatigue machine used for testing crankshafts. With a small power output from an electromagnetic vibrator the crankshaft throw is set at or near resonance. (Chrysler Corporation.)

ricated components, in which loading conditions simulate actual service operation. This involves two steps: Determination of operating loads and stresses, and determination of the strength of the fabricated part under those loads.

The advent of electric and magnetic gages has provided a reliable means for measuring the loads and stresses encountered in service. The gages are fastened to the part and a change in the electrical resistance or in the magnetic flux of the gage is a measure of the change in strain in the part due to the applied load. The signal from the gage is recorded by means of a suitable instrument such as a cathode ray oscilloscope, Brush recorder or a multichannel galvanometer recorder. Once a record is obtained of strains encountered in service they are converted into loads through a suitable calibrating fixture.

As to the determination of strength, the vast majority of parts are subjected in service to a fluctuating or fatigue loading and the test fixture should duplicate this condition. General utility fatigue machines are available in which a variety of parts can be tested under different loading conditions. Other machines can be constructed for a specific purpose, such as the one shown in Fig. 2. Recently, a number of test fixtures have been built on the tuning fork principle in which the part, through the addition of weights, is made to vibrate at or near resonance. This allows for the testing to be done with a vary small load, which can be derived from an electromagnetic exciter, as shown in Fig. 3, or with an eccentric weight attached to the tuning fork mass and driven by a motor.

It is not particularly significant at what speed the fatigue machine is operating except higher speeds are to be preferred for a quicker termination of the test. The upper limit of speed can be set by the machine itself, because of the inertia effect, or by the hysteresis losses in the tested part which lead to a lower fatigue strength than actually encountered in service. In some applications the latter can be quite significant, as for instance in some induction hardened parts, which are likely to overheat above 2000 rpm, if high loads are involved. In through hardened parts higher speeds of testing can be utilized. From a practical viewpoint there is no particular advantage to test at speeds higher than 10,000 cpm because in any test program the time spent in obtaining and installing the parts and in setting the machine is often commensurate with the total time spent on testing.

One of the problems in fatigue testing is to define the beginning of failure. In small specimens the pro-

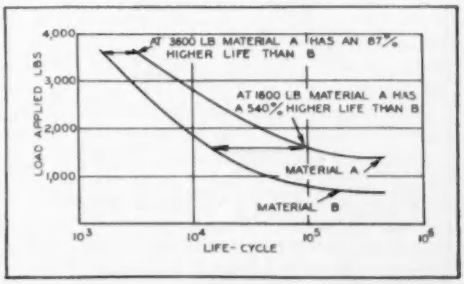

Fig. 4—A comparison between two materials or designs in terms of their lives is meaningless unless the load is specified.

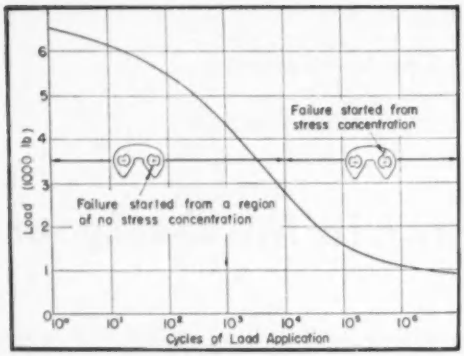

Fig. 5—The type of failure depends on the magnitude of the load applied. To duplicate field failures service loads must be duplicated.

pagation of a crack is rapid and failure is characterized by fracture or an appreciable change in the loading capacity of the specimen. In larger parts the speed of the crack may be much slower, with a result that the time of failure is often less well defined. Recently a method was developed[3] which allows for an accurate determination of the inception of failure. Small insulated wires are cemented to the critical sections of the part and when minute cracking occurs the wire ruptures, which interrupts a suitable electrical circuit.

The problem of duplicationg the load encountered in service is of paramount importance in any fatigue test program. It is true that in case of parts of simple form, such as round shafts, having no section discontinuity and compared for the relative effectiveness of materials it is not particularly significant whether they are subjected to a bending or a torsional load. In both cases the materials will arrange themselves in approximately the same relative order of their fatigue strengths. In all other cases service loads should be simulated.

Frequently the test program arises out of failures in the field. This simplifies the problem of testing because service failures themselves establish the criterion for the applied load. That is, the load should be applied in such a manner as to duplicate field failures. This is significant because service failures are often due to unpredictable loads rather than to a load

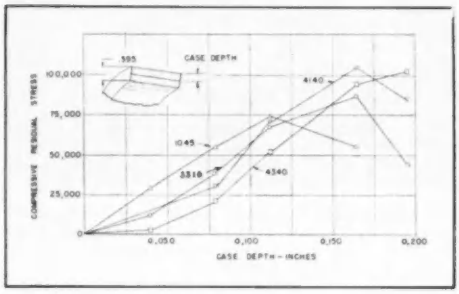

Fig. 7—Effect of case depth in induction hardened parts on the residual stresses.

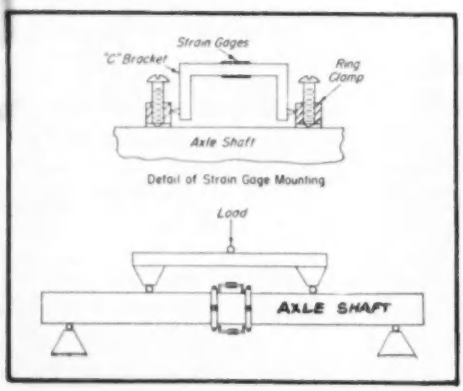

Fig. 6—Method for measuring residual stresses in shafts due to cold straightening.

assumed from the conventional operation of the part. Thus, in one test program involving a connecting rod, service failures could not be duplicated as long as pure axial loading arising from inertia and gas pressure was applied. It was not until a small torsional load component was added that service conditions were simulated.

There still remains the problem of duplicating the magnitude of the service load. Most load carrying members in a car or a truck are subjected to a spectrum of loads, as for example suspension members which may carry a *1 g* load on a smooth road, *2 g* on rough roads and perhaps *3 g* over rough obstacles and pot holes. A crankshaft carries full engine torque under some conditions but only a fraction of that torque most of the time. Which value should be duplicated on the test machine? That this question is not just of an academic importance can be gathered from Fig. 4, where curves are drawn to show the relative effectiveness of materials A and B. The curves are derived by fatigue testing to destruction a number of A parts, each at a different load, and duplicating the

Fig. 8—The shape of the coarse crystalline zone, its position relative to the center of the fracture and the radial marks at the periphery indicate that the load responsible for failure was low and stress concentration in the fillet not significant.

procedure for parts B. The curves drawn through the test points are known as *S-N* curves and they establish the fatigue strength of each part.

Note that if A and B are compared at a load of 3600 lb, A appears to have an 87 per cent higher life than B. The same comparison at 1600 lb will give a 540 per cent differential. This shows the obvious fallacy of conducting a test at loads not duplicating service conditions. Both 84 per cent improvement and 540 per cent improvement are in themselves correct, except that if service loads are 3600 lb the 540 per cent improvement becomes a totally fictitious figure.

This brings up the following point. If service loads are known a comparison in terms of life is valid. If

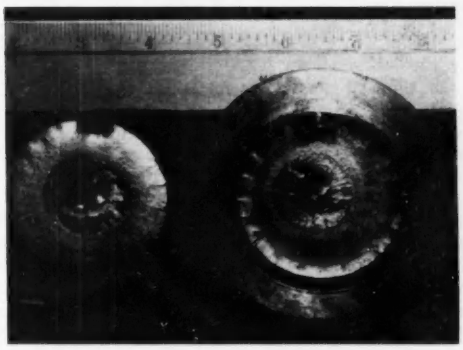

Fig. 9—In contrast with the fracture shown in Fig. 8 this failure was due to a severe stress concentration superimposed on a high operating load.

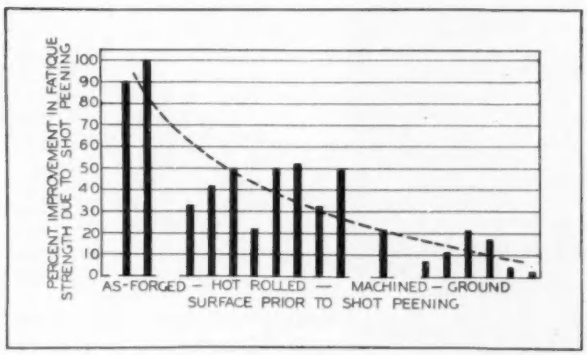

Fig. 10—The quality of the surface prior to shot peening determines the degree of improvement to be anticipated.

not, a more valid comparison can be made in terms of load. In the present example A has 60 per cent higher load capacity than B.

Hand in hand with the duplication of service loads goes the duplication of field failures. This is emphasized by Fig. 5, where it will be noted that for loads applied from one to approximately 10,000 times failure took place across the small section of the link. This is consistent with the view that when load is applied only a few times the condition is similar to static loading for which failure is determined by the nominal stress (section size) rather than by stress concentration. As the number of load applications increased, failure took

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Latest Advances in Cast

THE past year has witnessed many important advances in the cast iron field. Not only has work been done to secure cast materials of better properties and greater uniformity but the industry has gained further appreciation of the problems to be solved in the control of properties and processes if the rate of progress is to be maintained. Higher specifications, increased costs and shortages of raw materials, as well as the growing restrictions against dust, smoke and fumes, are bringing about far reaching changes in the design of new foundry equipment.

In the field of metal compositions, perhaps the most interesting activity has been in the direction of developing the new nodular irons into commercial production. Nodular irons bear resemblances to the present gray irons, malleable irons and to steel. They resemble gray irons in their method of production; a suitable iron composition is melted and, before casting, is treated with an alloy containing magnesium or cerium. Nodular iron resembles malleable and pearlitic malleable iron in its properties although the levels of strength and toughness are somewhat greater than for the malleable group. In addition, in nodular iron the section of the casting is not limited to a maximum of about 1½ in. Its strength and toughness rival that of many steel castings. Nodular iron will cast more easily than steel or malleable iron but not as readily as gray iron.

Castings which have been produced of nodular iron range from small C-clamps up to 40,000 lb. It is reported that a casting weighing 110,000 lb is to be made in the near future.

Parts which seem to lend themselves to this material include water pipe, pressure castings, axle housings, gears and dies. Nodular iron can readily be flame hardened.

A minimum properties specification has been proposed by Reese of the International Nickel Co., as shown in Table 1.

Actual values are usually higher than these; for example, under favorable conditions 15 per cent elongation can be secured with tensile strengths in the neighborhood of 80,000 psi.

Although great progress has been made, nodular iron castings are not as yet readily obtainable in the automotive field on a production basis. Many obstacles remain for the foundryman to overcome before he can guarantee uniformity of production. The steps that are being undertaken to surmount these difficulties will probably be of greater benefit to the gray iron industry as a whole than to the nodular field.

Perhaps the most important thing for the automotive engineer to realize is that small castings in particular may require a heat treatment in order to secure uniformly the benefits of easy machining, strength, toughness and absence from internal stresses. The combination of mechanical properties after suitable treatment and in sections under three in. can run considerably higher than those of the proposed specification. The properties, as shown in Table 2, are conservative for what may be obtained from suitably heat treated castings.

In some instances small castings may be partially white iron as cast but will anneal to a truly nodular iron. Without heat treatment, unless a great deal of foundry control is exercised, the ductility for a given strength is lower and the hardness higher than the above. In addition, the uniformity is apt to be less. Many automotive applications do not require the elongation values cited. Here the requirements are high strength, toughness greater than that of a high grade alloyed gray iron, and machinability. Many castings are made with a strength between 80,000 and 100,000 psi and 1 per cent elongation. These castings are given a simple stress-relieving heat treatment.

Obstacles barring the way to immediate wide use of nodular irons include such things as:

1. Difficulty in removing sulphur from the cupola melted iron.
2. Very troublesome slag where sulphur is not previously removed.
3. Learning new requirements in gating and risering the castings.

TABLE 1

Class	Tensile Strength (psi)	Yield Strength (psi)	Elongation (%)
90-65-2	90,000	65,000	2
80-60-5	80,000	60,000	5
70-50-8	70,000	50,000	8
60-45-15	60,000	45,000	15

By Richard Schneidewind
Professor, Dept. of Chemical and Metallurgical Engineering, University of Michigan

and R. G. McElwee
Formerly Manager Iron Foundry Division, Vanadium Corp. of America

Iron Field

TABLE 2

Tensile Strength (psi)	Yield Strength (psi)	Elongation (%)	Brinell
90,000	72,000	6	210
80,000	65,000	10	190
70,000	55,000	15	165

4. Closer control of metal temperatures necessary.
5. Methods of adding the alloy.

It is true that some foundrymen have overcome these difficulties in part but there is still much to be learned in this field.

Malleable and pearlitic malleable irons as a class have properties resembling those of the nodular irons except that the strengths are lower for any given elongation value. Their use is limited by the fact that sections over 1½ in. are difficult to make but within this limitation at present, prices are usually lower in cost than their nodular iron counterparts. In the pearlitic grades these irons have found wide automotive applications in rocker arms and camshafts. In the home refrigerator field many compressor crankshafts are being used. In the fully annealed condition, malleable iron has supplied well-established needs for automotive parts such as clutch and brake pedals, and housings of various types. No spectacular new uses have been developed in the past year.

In the gray iron field there have been no significant changes in applications but rather a steady pressure toward better quality and uniformity. In the better grades gray irons have replaced steel castings and forgings. Over half of the automotive camshafts are alloyed gray irons with suitably hardened wearing surfaces. All automobile and truck brake drums are either gray iron or steel surfaced with gray iron. In cylinder and brake drum irons there has been a trend to somewhat higher carbon and lower silicon contents in an effort to promote greater soundness and wear resistance. Both the ASTM and SAE have specifications covering gray cast irons. For example, SAE 120 mentions a sulphur of 0.12 per cent and a manganese of 0.90 per cent. Manganese is not plentiful and some cutting may have to be done if the situation becomes more serious. In the past few months the quality of the coke has deteriorated so that the sulphur contents of irons tend to rise. This makes necessary the use of

(*Turn to page* 90, *please*)

The Materials

By Karl Rannells
Washington Bureau, Automotive Industries

Increasing needs for the expanding national defense and foreign arms aid programs are gradually pulling the drawstring tighter around the neck of the materials bag. Basically, conditions are far better than when defense preparations began a decade ago. There is more industrial capacity and more production; there is additional capacity lying idle in standby plants.

And now that the first shock of an undeclared shooting war has worn off somewhat, even the most pessimistic concede that considerable time will be required to get stepped-up military production into high gear. It requires time to feed down orders to the hundreds of subcontractors and suppliers so necessary to a prime contract.

There should be a shorter time lag in the automobile and related fields, of course, because of the production schedules which have already been worked out between the military and industry. But it also must be kept in mind that such prepared programs have been based primarily on total mobilization which is not in the cards at present. Supply lines must be rearranged to fit current schedules.

Thus, from an overall viewpoint and barring additional foreign trouble, the immediate future would seem to hold nothing worse than tightened belts and spot shortages. The real impact will not come until next spring.

This is not making light of the situation. Shortages of materials offer a real threat. Even now they are beginning to be felt in some quarters. The impact will increase as the nation gets rolling toward the planned $30 billion a year preparedness program.

Both the quantities of materials as well as the total number of end items needed for the military are still largely unknown. It is more than just multiplying the number of vehicles or items needed by the amount of material required for manufacture. For instance, on the basis of information assembled by the military planning groups, it is figured that 9300 lb of steel, 70 lb of copper and 20 lb of aluminum must be allowed for making an average 2½-ton military type truck. Or, using the same tables, it takes more than 3400 lb of steel, 55 lb of copper, and 11 lb of aluminum to build a passenger car for the services. And, not counting armament, it takes at least 6500 lb of steel to construct a transport plane of the Constellation type.

It is also a question of getting the right kinds of materials to the right manufacturers. For example, hot rolled steel sheets must get to bodymakers, frame and fuel tank builders; hot and cold rolled bars to makers of clutches, steering systems, and brake mechanisms; and pipes and tubes to transmission, steering, and fuel system manufacturers; or copper to makers of radiators, wiring, gaskets, and even brakes.

Add these and other calculations together and, on the basis of White House estimates, plus testimony before Congressional committees, military requirements will take somewhere between 10 and 15 per cent of all production.

Spread this out over a probable $275-$300 billion

Shortages

By LEONARD WESTRATE

DETROIT.—Materials are getting increasingly tight for the automobile industry. Heading the list is sheet steel. Because of the shortage most automobile companies today are using considerable conversion steel—that is buying ingots or bars from the mill and having them shipped to another source for rolling into sheets. Ford is understood to be using conversion steel for about 35 per cent of its total requirements. Total steel costs of the industry naturally are considerably higher when conversion steel is used. Nickel also is very short because of the large demand and Government stockpiling. The industry currently is considering a reduction in the amount of nickel used and also is studying substitutes. Chrome also is critical. Chromic acid is very critical, princi-

Outlook—

Curtailed Supplies Offer a Real Threat and Even Now Are Beginning to be Felt In Some Quarters

economy and it is not a large bite. The real pinch is likely to come not from a shortage of some major basic item like steel or aluminum but from a scarcity of some contributory item such as copper, chromic acid, or soda ash.

It is true that steel plants are booked far ahead, many of them well into next year's production schedules. Even now it is difficult to place an order for first or second quarter delivery unless a defense contract can be shown.

August and September steel deliveries to automobile makers were below promises and resulted in the industry dipping into already small inventories.

But military buying was only a lesser factor in this situation. More important were: an expanding civilian economy, changes in product mix (types of steel consumed), and recent scare buying.

Steel production capacity has expanded from less than 82,000,000 tons in 1940 to more than 100,000,000 at present. New facilities under construction will raise this figure to well above 106,000,000 tons in 1952. This capacity increase alone is sufficient to produce as much steel as was used for war purposes during the peak year of 1944—about 21,000,000 tons.

There have been vast changes in the product mix, especially the demand for flat rolled and stainless steel since the early Thirties, and the automobile industry is the largest single consumer of flat rolled products.

For example, a "typical" passenger car would require the following approximate poundage in hot and cold rolled sheet and strip:

Body, 875; chassis, 325; frame, 300; wheels and brakes, 200; bumpers and guards, 65; engine and clutch, 35; and fuel and exhaust systems, 15 lb.

But flat rolled products also are needed in increasing tonnages by the booming refrigeration and similar industries. Larger tonnages of steel are going into tin plate (10 billion tin cans were fabricated last year), and the growing television industry is demanding more stainless steel products.

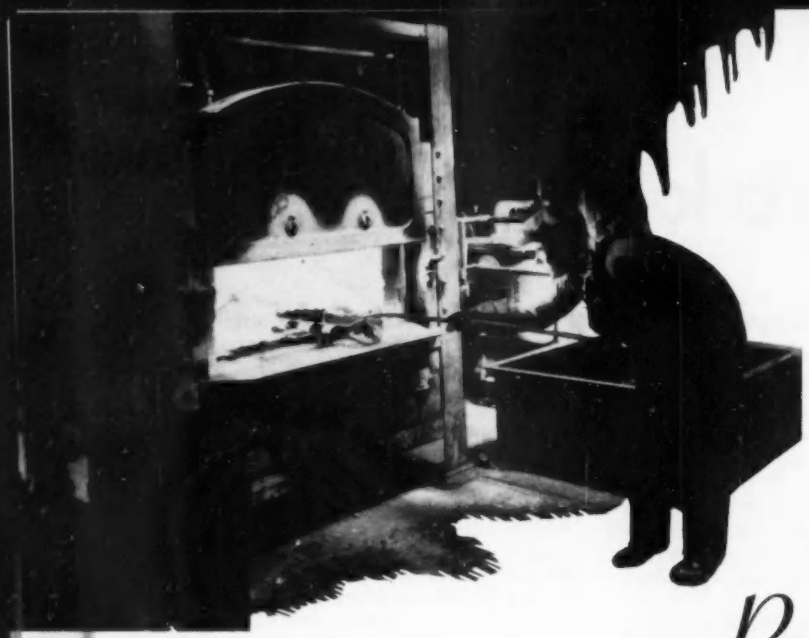
Looking back to World War II, about 13 per cent of all steel produced during the actual war period went into ship-building, another nine per cent into ordnance, tanks and similar items, and five per cent into construction of defense or war plants. Considering additional capacity, no such percentages are now visioned as needed, even under full mobilization. Some sort of allocation, however, voluntary or otherwise, seems to be in the cards to assure equitable distribution.

Aluminum is in much the same position. There is no shortage of primary metal as such. The 1950 production has been running at the rate of approximately 700,000 tons. This is four times the production of 1939, compared with the peak wartime production rate of about 920,000 tons. In addition to current output, another 100,000 to 150,000 tons of additional capacity is scheduled to go into production next year as

(*Turn to page* 100, *please*)

for Automobiles

pally because of the prolonged strike in the chemical industry. However, this is probably a temporary situation and should improve now that the strike has been settled. Pig iron is another scarce item and there is some belief that the shortage will get worse. Kaiser-Frazer is planning to open soon its pig iron facility at Provo, Utah, in order to help alleviate the scarcity. Copper is tight, but not yet critical. The industry is conserving copper scrap and sending it back to the mill and there also is some hope for relief by importing foreign copper. It is expected that if copper does become critical the import duty will be removed. Rubber is in tight supply, but there still is enough fo get by. Zinc is in about the same situation as rubber. Lead and tin although not exactly plentiful are not too much of a worry at present.



Extensive Program for Metal Congress and Show

HAVING for its theme, "Materials and Equipment for High Production," the 32nd National Metal Congress and Exposition, to be held Oct. 23-27 in Chicago, will bring together the metalworking industry's fullest knowledge of materials, processes, and equipment. The event is being sponsored by the American Society for Metals, American Welding Society, Metals Institute Division of the American Institute of Mining and Metallurgical Engineers, and the Society for Non-Destructive Testing.

During the week about 350 nationally known firms, engaged in the production of metals, their treatment and fabrication, will exhibit their equipment, products and services in Chicago's International Amphitheater. Over 200,000 sq ft of floor space have been assigned to the companies. Many of the new products and new equipment to be exhibited and demonstrated at this show are described and illustrated on the following pages.

Walter E. Jominy, well-known Chrysler engineer, will take office on Oct. 26 as the new president of the American Society for Metals.

• The four sponsoring societies, through their scheduled seminars, lecture sessions and meetings on technical subjects pertaining to metals production, treating and processing, will provide show visitors with daily opportunity to hear vital technical subjects discussed and analyzed by some of the country's leading engineers, researchers and teachers. These technical meetings will be held in Hotels Palmer House, Sherman, Sheraton and Morrison. The American Society for Metals and the American Welding Society will hold morning, afternoon and evening sessions throughout the week. The Metals Institute Division, American Institute of Mining and Metallurgical Engineers will have daily and evening sessions Monday through Wednesday. The Society for Non-Destructive Testing has scheduled morning and afternoon technical meetings on Tuesday, Wednesday and Thursday. The ASM Educational program will be covered by three series of lectures on Monday, Tuesday and Wednesday, Oct. 23, 24 and 25. The subjects are "High Temperature Properties of Metals," "Interpretation of Tests and Correlation with Service," and "Metallurgy of Titanium." The American Society for Metals technical contributions will also include the Society's Seminar on Atom Movements, held on Saturday and Sunday prior to the exposition opening on Oct. 23. The ASM Metallographic Exhibit will also be on display on the floor of the Amphitheatre during the entire five-day show.

Among the special events will be the ASM business forum and sales clinic. Top management executives of metals producers and of the five principal metal consuming industries will meet together Oct. 26 in the business forum. Marketing and distribution of industrial equipment and products will be the main topic at the sales clinic.

(*Turn to page* 104, *please*)

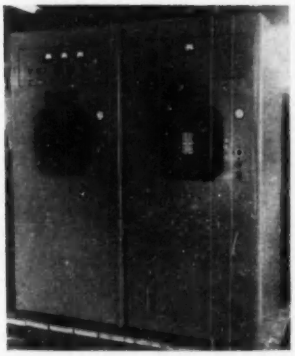
Chicago AT THE WHAT'S NEW National Metal Show October 23 to 27

FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 54

Booth 910

MS-1—Induction Heating Unit

Tocco Div. of the Ohio Crankshaft Co., Cleveland, Ohio, has developed a new and very adaptable radio frequency tube-type induction heating unit, the Toccotron, designed for heating small ferrous or non-ferrous parts for hardening, annealing, brazing, forming or melting. Adaptable for very shallow surface hardening, it operates from 220/400 volt line supply and delivers 20 kw at a frequency of approximately 450,000 cycles. The piping in the unit



Tocco 20 kw radio frequency tube type induction heating unit, the Toccotron

is all of plastic or copper tubing with flared type compression fittings. For a two-station machine, the power is automatically transferred from one station to the other, and separate transformers are supplied for each station.

Booth 2106

MS-2—Improved Lapping Machines

Improved models of the Lapmaster are being demonstrated at the booth of the Crane Packing Co., Chicago, Ill., that are suitable for the lapping of parts up to 27¼ in. diam. Precision lapping of parts to flatnesses of millionths of an inch and finishes of one to three micro-in rms is possible. The principle of operation for all Lapmasters (Models 12, 24, 36, 48 and 72) is the same.

A conditioning ring work-holder combination freely rotates on the lapping plate. Number and size of the rings depend on the model. As work is lapped, the conditioning rings actually lap the lapping plate, keeping it in a perfectly flat condition. Lapping compound is fed to the plate from an agitator tank by means of a feed track and solenoid valve. The lapping plate agitator and solenoid are all individually controlled, and the entire lapping operation is automatically timed by a special device.

Booth 1807

MS-3—Vibration Mountings

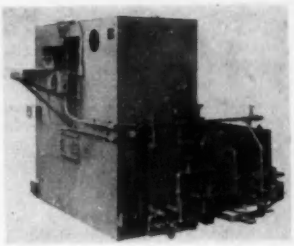
Lord Mfg. Co., Erie, Pa., will exhibit several hundred vibration-control mountings of sizes and types suitable for solving vibration problems in mechanical products and in the factory. Among these will be the new Temproof mountings which are not affected by extremes of temperature, and the new Radiofocal mounting bases for JAN-C-172A base mounted electronic equipment.

The Lord exhibit also contains a considerable number of bonded rubber (rubber - bonded - to - metal) component parts designed to show how bonded rubber parts can simplify functional assemblies. Other samples show how precision molding of rubber parts is used to improve product performance.

Booth 2222

MS-4—Special Degreaser

Displayed by Detrex Corp., Detroit, Mich., is a special design of degreaser with rotary internal conveyor for the handling of work through a vapor-spray-vapor or a vapor-immersion-vapor cleaning cycle. The conveyor mechanism indexes to a loading station where baskets or trays of work are



Detrex "Gyro" degreaser with rotary internal conveyor

loaded into position from a gravity roller conveyor.

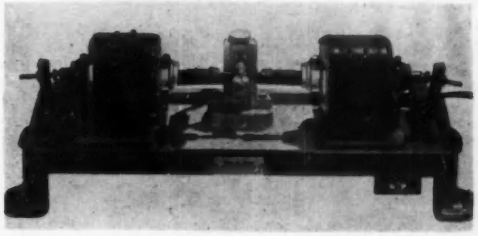
The degreaser, identified as "Gyro," will be in production operation in the booth, having a plate glass top so that the working of the interior mechanism may be seen.

Additionally to be displayed is a new and improved rotary drum washer. This machine will have a plastic top so that the interior mechanism may be viewed.

Booth 722

MS-5—Countersinking And Burring Machine

A new machine for countersinking, chamfering and burring is being manufactured by Black Drill Co., Cleveland, Ohio. It consists of a cast iron base on which are mounted two traversing shaft motors with opposed cutting tools mounted in collets at the ends of the shafts—plus a tool post and work holder located at the center of the assembly. The tool post has micrometric adjust-



Black's unit for countersinking, chamfering and burring

FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 54

ments and the work holder is made of tungsten steel.

Tools are brought to the work by depressing a foot pedal which actuates both shafts simultaneously. Each shaft is equipped with a micrometric adjustment for close control of cutting depth.

Motors from 1/3 to one hp and 600 to 3600 rpm can be used depending upon the size, cutting speed and material to be machined. Maximum stroke limited by the motor shaft travel is 2 in., permitting a wide variation in the types and sizes of work that can be performed. Also, for work that does not require the two motor set-up, single motor units can be supplied.

Booth 2753

MS-6—Electronic Steel Sorter

Steelsorter, manufactured by Fisher Scientific Co., Pittsburgh, Pa., is new, portable electronic instrument that distinguishes between steel sections of the same physical dimensions by measuring their magnetic properties — properties influenced not only by chemical composition but also by working and temperature treatment. The method used is rapid and nondestructive, and the instrument simplifies the problem of separating steels

Booth 1106

MS-7—Prepared Atmosphere Generator

One of the featured items to be displayed by Surface Combustion Corp., Toledo, Ohio, will be the new Surface MRX-800 prepared atmosphere generator. It is designed to produce 800 cfh of atmosphere gas for use in gas carburizing, dry cyaniding, clean hardening and bright annealing of all types of steels. This unit is the largest capacity endothermic generator developed by Surface as a standard-rated catalog unit.

Booth 714

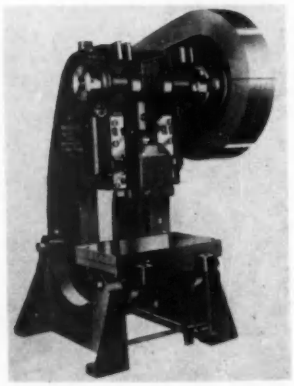
MS-8—Bellows Type Thermostats

Chicago Metal Hose Corp., Maywood, Ill., is exhibiting its new line of Flexon automotive thermostats of the standard bellows type. Manufactured for all popular models of passenger cars and trucks, and for tractors and engines, they are available for both winter and summer use

Booth 1720

MS-9—Power Press

Sales Service Machine Tool Co., St. Paul, Minn., is featuring their new 85-ton Press-Rite power press that has two tie-rods built into the frame to insure extra rigidity. In this open back, gap frame type press, the frame is one-piece special alloy. Features include the Press-Rite non-repeat single stroke mechanism and the automatic cam actuated brake, anti-friction roller bearings in the flywheel, four point engagement special sliding key clutch on the flywheel drive or air friction clutch and brake on the back geared press. The ram slide, with large and long ram ways, is triple lubricated and counterbalanced with steel bushed hole for holding die shanks in the slide.



Sales Service 85 ton Press-Rite power press

Booth 1624

MS-10—Carburizing Furnace Control

Principal feature of the exhibit of Leeds & Northrup Co., Phila., Pa., is an illuminated demonstration of the company's Integrated Control of temperature, air-fuel ratio and draft for fuel-fired industrial furnaces. Applicable to slab, billet and annealing furnaces and soaking pits of all types, this all-electric control system combines a Micromax or Speedomax pyrometer for temperature control, a newly-improved air-fuel ratio controller of the full-metering, proportioning type for maintaining furnace atmosphere and combustion efficiency, and a furnace pressure controller for automatically adjusting draft to hold temperature distribution constant and compensate for furnace leakage. The temperature control system will be the new P.A.T. '50 control complete with rate action, which is capable of greater sensitivity and faster response to changes in heat demand than any previous electric control system.

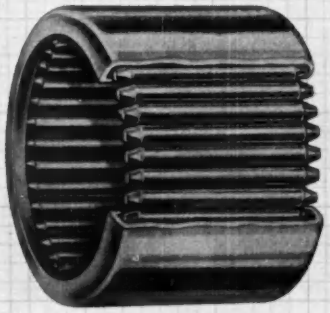
Microcarb control of carbon content of atmosphere in Homocarb carburizing furnace, consists of Carbohm carbon-detecting element mounted in furnace work chamber, Microcarb Controller for automatically regulating feed of carburizing fluid, and Micromax Recorder to draw a continuous record of per cent carbon

A major advance in control of carburizing furnaces is demonstrated by

known by the company they keep

This is one maxim that certainly applies in the case of Torrington Needle Bearings. The list of Needle Bearing users reads like a "Who's Who in American Industry." There's no better proof of the soundness of engineering embodied in Needle Bearings than their excellent performance in thousands of famous-name products.

In your automobile, lawnmower, outboard motor, sewing machine, hand drill . . . and in farm equipment, textile machines, machine tools, aircraft—Needle Bearings help ease your work and keep our economy going. Why not add your product to the growing list of those that benefit from Needle Bearing operation?



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the new Homocarb furnace complete with Microcarb control of carbon content in the furnace atmosphere. The new control device measures and automatically controls the carburizing potential of the furnace gas

Other new apparatus on display consists of equipment for recording temperatures of rolls without actually contacting the rotating surface, and two types of immersion pyrometers for molten steel baths—an immersion-type platinum thermocouple with a special Speedomax Recorder, and the immersion Rayotube pyrometer.

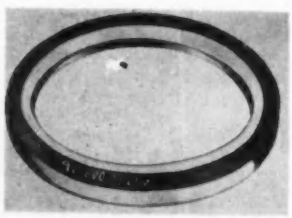
Booth 2541

MS-11—Alloyed Nickel Valve Seat Inserts

Cast from a highly alloyed nickel by Martin Wells, Inc., Los Angeles, Calif., new Well-Tite valve seats are said to solve a large portion of the valve seat difficulties now encountered in heavy-duty industrial and truck engines, such as seat checking, air hardening, work hardening, seat fatigue and many other problems faced by the engine maker.

Valve seat inserts manufactured from this alloy are claimed to be free from checking and burning under extreme temperatures. They are stated not to fatigue and loosen in the block. And under no conditions will the material from which they are made air harden or work harden, according to the company. Additionally, density of the material is said to facilitate dissipation of the heat trapped in the valve, and to reduce valve temperatures.

For industrial engines subject to severe dust conditions — bulldozers, tractors, sand and gravel trucks—this alloy in Well-Tite valve seats is cited as extremely tough and abrasive resisting.



Well-Tite industrial and truck engine valve seat inserts of highly alloyed nickel

Booth 2537

MS-12—Twin Cyclone Dust Separator

Twin cyclone dust separator No. 219, latest development by Torit Mfg. Co., St. Paul, Minn., incorporates two cyclone separators of the same size used in the Torit Nos. 18-FM and 19-FM Models, mounted on a common bottom reservoir, which has a 20 in. wide, 28½ in. long, 15½ in. high pull-out drawer—capacity about 4½ cu ft. The model is available only for outdoor exhaust (not available for indoor recirculation). It develops approximately double the air volume (cfm) of any previous Torit cyclone type dust separator

Booth 2106

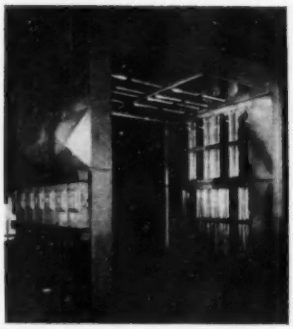
MS-13—Tube Rolling Control

New product to be on demonstration by Crane Packing Co., Chicago, Ill., is their tube rolling control, the John Crane, for the uniform expansion of tubes used in heat transfer equipment. In operation, the current supply to the electric driving motor is transmitted through the control. Since the torque load on the driving motor is a function of the correct degree of tube expansion, the control is designed to interrupt the current supply to the driving motor precisely when a predetermined torque load is reached.

Proper loading for any particular tube alloy and joint can be predetermined and calibrated as dial settings on the John Crane control.

Booth 2527

MS-14—Electric Oven



Radiant Calrod, new electric oven for paint baking, placed on the market by Jensen Specialties, Inc., Detroit, Mich., is a self-propelled unit that moves back and forth automatically over a freshly painted bus or truck for a period of approximately 20 min. Rod type heaters made by the General Electric Co. are used in aluminum reflectors as the heat source. Similar equipment is available for prefabricated construction of industrial ovens for temperatures ranging from 200 to 600 F.

Booth 319

MS-15—Work Piece Holder and Head

New reciprocating work piece holder with a new universal head brought out by The Osborn Mfg. Co., Cleveland, Ohio, will be set up as shown for gear deburring. Also featured at the booth will be operation of the company's new Heli-Master brush used for scrubbing sheet steel

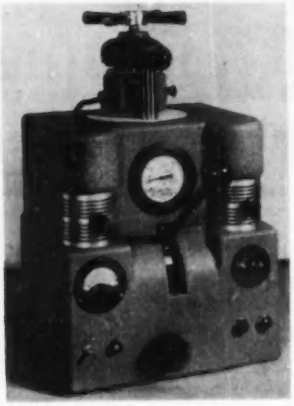
(Turn to page 52, please)

Chicago AT THE WHAT'S NEW National Metal Show October 23 to 27

FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 54

Booth 615

MS-16—Specimen Press For Metallurgists



Buehler AB speed press for metallurgical specimens, No. 1330

New No. 1330 AB speed press offered by Buehler Ltd., Chicago, Ill., provides the metallurgist with an accurate tool for preparation of mounted specimens which are not restricted to preparation in opaque thermosetting Bakelite compounds, but are equally practical for mountings in crystal clear thermoplastic AB Transoptic compounds.

This AB speed press produces mounts in 2½ to 3½ minutes, and may be used with one in., one and one-quarter in. or one and one-half in. molds.

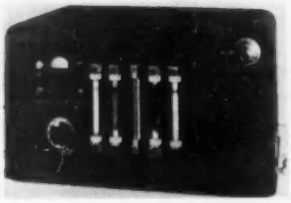
The premolds for one in., one and one-quarter in. or one and one-half in. molds are inserted into the storage compartment openings of the press equipment. The premolds are released preheated and ready for use in making the specimen mounts. These require only 2½ to 5 minutes to cure, depending upon the size of the mold.

Use of measured premolds in place of plastic powder provides an entirely new idea in specimen mounting technique never before used on any metallurgical specimen mounting press, the company states. It eliminates the use of dusty powder and promotes cleanliness in the operation and preparation of metallurgical samples.

Operation is controlled by pyrometer, timer and thermostats.

Booth 2753

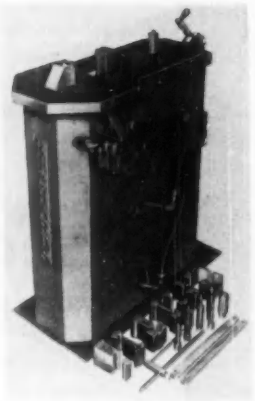
MS-17—High Frequency Induction Heater



Completely automatic, high frequency induction heater produced by Fisher Scientific Co., Pittsburgh, Pa., makes possible rapid and accurate carbon determinations in all types of ferrous materials, from steels with low carbon content to stainless steels and cast iron. This apparatus has been used successfully in both gravimetric and volumetric analyses. It produces extremely high temperatures (in excess of 3000 F), has a built-in purification train, and accommodates a full factor weight of 2.727 g.

Booth 1914

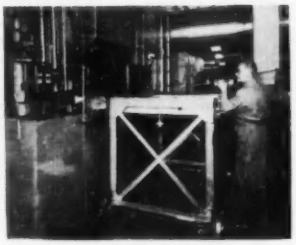
MS-18—Air Operated Metal Bender



New model Multiform Big Brother air operated bender is on display for the first time at the Metal Show by J. A. Richards Co., Kalamazoo, Mich. Of heavier construction and with simplified controls, the Big Brother air bender is claimed excellent for the fabrication of irregular shaped metal parts, springs, bussbars, aircraft modification work or aircraft production work, etc.

Booth 614

MS-19—Controlled Atmosphere Furnace



Holcroft new batch-type controlled atmosphere furnace

New batch type furnace, put out by Holcroft & Co., Detroit, Mich., handles a variety of parts for various controlled atmosphere applications such as clean hardening, drawing, carbon restoration, light case carburizing and carbonitriding. Complete automatic cycling enables one man to operate several furnaces, and proven radiant heat with a temperature build up feature reduces heating up time. High ratio of heat treating time to total time in the furnace is said to be obtained by having a large vestibule accommodating an entire furnace load for quenching in one operation. Types of quenching available are hot oil, cold oil or slow cooling in the atmosphere controlled vestibule.

Booth 502

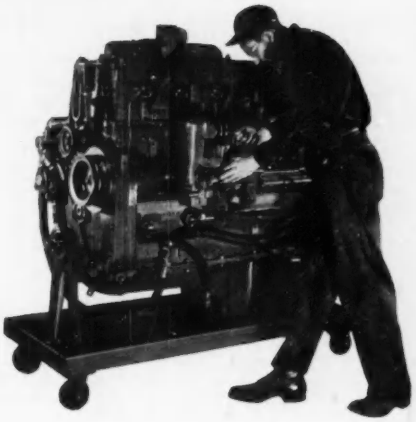
MS-20—New Metallograph

Bausch & Lomb Optical Co., Rochester, N. Y., is presenting a new metallograph. This Balphot metallograph is stated to provide equipment that combines the economy of more limited capacity instruments with many of the performance advantages of the most advanced metallographs. The Magna-Viewer screen, stage, microscope and eyepiece are all in one line, for easy direct observation. Controls are centralized. A new fine adjustment mechanism raises and lowers the stage 0.1 mm per revolution of fine adjustment. An improved heavy duty mechanical stage, has built-on, ball-bearing rotatable support. A new elevating device eliminates

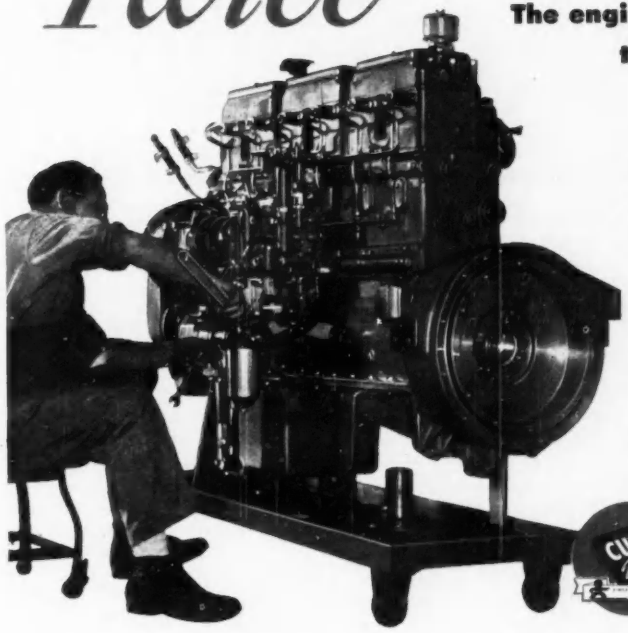
(*Turn to page* 112, *please*)

Cummins® Custom-built Diesels

Built not once but Twice



The engine that's built better to give power at lower cost



Why is a lightweight, high-speed Cummins Diesel the best buy in economical, dependable power? *Because every* part of *every* engine is made under strictest quality control methods. Each engine also is actually built *twice*. After initial assembly, each engine is run-in on the test block. Then it is torn down and carefully re-inspected—after that it is re-assembled and tested *again*.

Perfection in engine craftsmanship . . . Cummins exclusive fuel system . . . an unexcelled service and parts organization . . . mean that rugged, dependable Cummins Diesels make more profits for power users.

There's a model for your power needs. Contact your Cummins dealer. He has more facts to show you about making more profits with

Diesel power by CUMMINS

CUMMINS Dependable DIESEL

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Lightweight High-speed Diesel Engines (50-550 hp) for: On-highway trucks • off-highway trucks • buses • tractors • earth-movers • shovels • cranes • industrial locomotives • air compressors logging yarders and loaders • drilling rigs • centrifugal pumps generator sets and power units • work boats and pleasure craft.

Publications AVAILABLE

New Industrial Literature listed in this department is obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

L-87 Jig Borers

Moore Special Tool Co.—The design and operation features of the company's No. 2 Jig Borer are described in a new 24-page catalog. Special sections are devoted to descriptions of the power plant, action photographs illustrate the complete operation. Also included are examples of toolroom and production jobs and a complete description of accessories and cutting tools.

L-88 Automatic Machines

W. K. Milholland Machinery Co.—Bulletin 110 illustrates and describes the various automatic units and special production machines that are manufactured by the company for drilling, boring, milling and tapping operations.

L-89 Fire-Fighting Equipment

Pyrene Manufacturing Co.—A new brochure on air foam or mechanical foam for fire fighting is available. It describes air foam, methods of application, specifications and operating characteristics, etc.

L-90 NoSpin Differentials

Detroit Automotive Products Co.—A new operation manual on NoSpin differentials is available. Included in the manual is background information on differentials; history of the early type NoSpins; descriptions, types, applications, etc.

L-91 Polyvinyl Materials

The B. F. Goodrich Chemical Co.—A new 16-page illustrated manual on Geon polyvinyl materials describes the properties, applications, compounding and processing of Geon materials.

L-92 Filters

Titeflex, Inc.—A new 8-page booklet describes the company's line of filters. The two-color booklet gives detailed information on sizes, capacities and motors and describes various metals from which the filters are made. Operating cycles, etc., are also described.

L-93 Dies

Allied Products Corp.—Precision cast Allite dies for producing experimental or short run parts are described in a new bulletin which also describes the coordinated foundry and die shop facilities of the Richard Brothers Div., where the Allite dies are produced.

L-94 Welders

Westinghouse Electric Corp.—Booklet DB 26-100 describes the new 200, 300 and 400 ampere selenium rectifier d-c welders. Included in the booklet is engineering information on these new welders, including relative power costs, performance characteristics, construction details, electrical and welding characteristics, dimensions and weights.

L-95 Abrasive Cutting Wheels

Chicago Wheel & Mfg. Co.—Moisture-proofed abrasive cutting wheels are described in a new 6-page folder which illustrates advantages and convenient features of this new development.

(*Turn to page 78, please*)

TIME SAVER COUPON

THIS TIME SAVER COUPON is for your convenience in obtaining, WITHOUT OBLIGATION, more information on any one or more of the publications described above OR New Production and Plant Equipment OR New Products items described on other pages.

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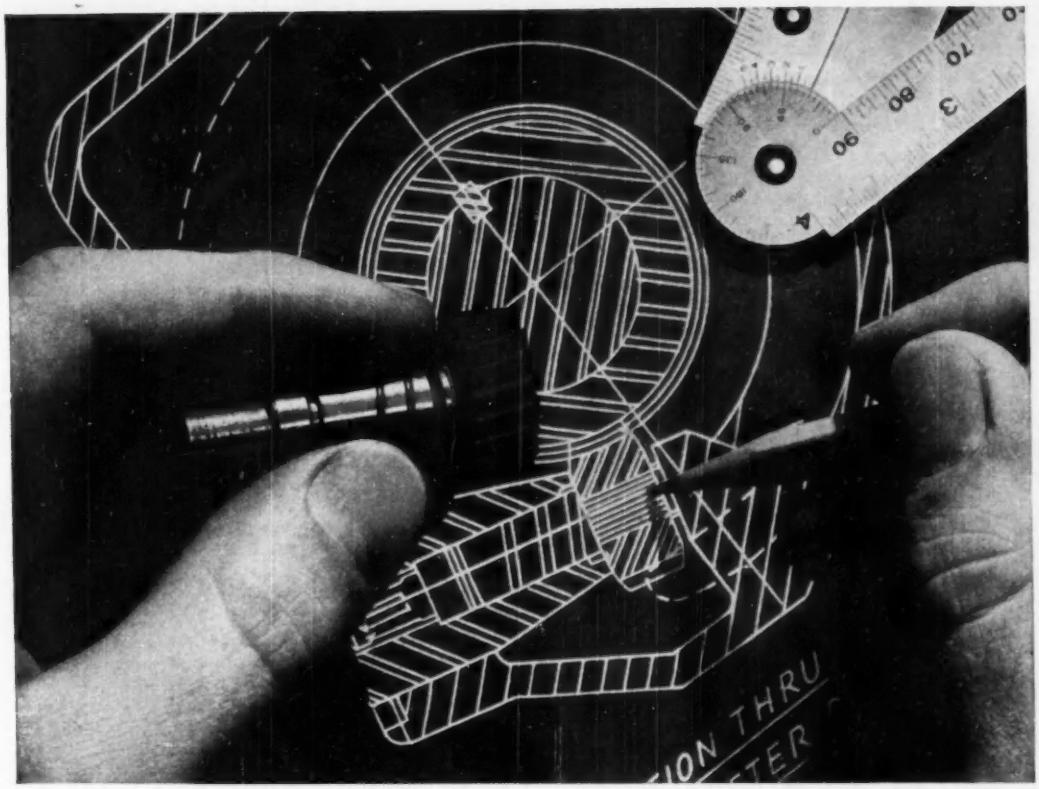
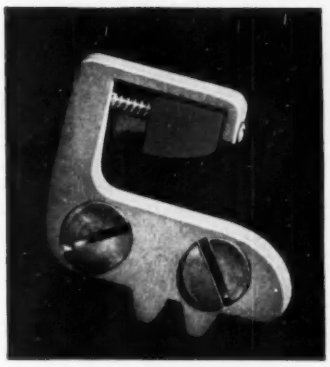


NYLON SPEEDOMETER GEAR ON '50 FORD REGISTERS 50% CUT IN PRODUCTION COSTS

Injection-molded to exacting tolerances in a single operation



Nylon door-lock wedge on 1950 Ford. Provides superior abrasion-resistance, high resistance to repeated impact of door slamming. Costs less than materials previously used. (Nylon part molded by Standard Products Co., St. Clair, Mich.)

A five-step operation was formerly required to produce this gear to drive the Ford speedometer cable. Now, in a single operation, Ford injection-molds nylon gears, complete with tooth identification, directly on the shaft. It is estimated that use of Du Pont nylon has reduced the man-hours needed to produce this gear to one-half the former figure—a 50% saving in over-all production cost!

Nylon gears perform better, too. Ford finds that closer tolerances can be held more economically. Tolerances for the nylon gear are ±0.001" for pitch diameter, and ± 0.002" for O.D. Too, nylon has superior wear- and abrasion-resistance. Rugged tests equivalent to 100,000 miles of operation at 80 m.p.h. proved nylon's ability to stand up without visible wear.

Nylon's outstanding advantages are saving money and improving performance in a number of automotive parts—interior lenses, insulator sleeves, grommets, gears, valve seats, lock-nuts. Its properties may well help you too. For free literature on nylon and other Du Pont plastics, write today. E. I. du Pont de Nemours & Co. (Inc.), Polychemicals Department, Plastics Sales Offices: General Motors Bldg., Detroit 2, Michigan.; 350 Fifth Ave., New York 1, N. Y.; 7 S. Dearborn St., Chicago 3, Ill.; 845 E. 60th St., Los Angeles 1, Calif.

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Hudson 1951

Line Includes New Hornet Model With 145 Hp, Six Cyl Engine

PRINCIPAL feature of the 1951 Hudson line is a new series to be called the Hudson Hornet powered by a 145 hp, six-cylinder, in-line engine. Except for the different engine the new series is identical in styling and wheelbase with the Commodore and Super lines. Hudson will offer Hydra-Matic drive on the Hornet and Commodore Custom series cars as optional equipment with Hudson Supermatic drive remaining as optional equipment on the Super and Pacemaker series.

The 145 hp engine to be used in the Hornet is very similar to the regular Hudson six engine except that it has a larger bore and longer stroke to give a piston displacement of 308 cu in. compared with 262 cu in. in the Super Six, 254 cu in. in the Super Eight and 232 cu in. in the Pacemaker Six. An aluminum high compression head is standard equipment giving a compression ratio of 7.2 to 1. However, premium fuel is not required for satisfactory operation if the ignition timing is properly set. The cylinder block is new, giving much greater rigidity and thickness of cylinder wall, and the new block design will be used in all of the 1051 Hudson six-cylinder engines.

Although Hydra-Matic drive is available on only the two top lines, it is known that if enough units were available they would be offered on all models and plans are in the works to make any changes necessary to accommodate Hydra-Matic throughout the line if and when it is available.

Exterior changes are confined principally to a more open type grille which flares out farther toward the fenders, integral parking lamps, and changes in ornamentation at the side and rear. The rear window now is one piece construction with an area of 863.4 sq in.

Considerable refinement has been put into the interior of the 1951 Hudson line. Hudson is the first to use a vinyl plastic trim material with knitted backing, which gives two-way stretch and consequently remains in place much better after long use.

The instrument panel has been changed by regrouping the instruments on a raised chrome panel directly in front of the driver and easily visible through the steering wheel. Considerable improvement also has been made in reducing glare on exposed metal surfaces. The designers have paid a great deal of attention to color in interior design and appearance has been greatly improved by use of contrasting colors and materials.

Hudson 1951 Engines

	Hornet Six	Super Eight	Super Six	Pacemaker Six
Horsepower	145	128	123	112
Bore (in.)	$3\frac{13}{16}$	3	$3\frac{9}{16}$	$3\frac{9}{16}$
Stroke (in.)	$4\frac{1}{2}$	$4\frac{1}{2}$	$4\frac{3}{8}$	$3\frac{7}{8}$
Disp. (cu. in.)	308	254	262	232
Comp. Ratio	7.2	6.7	6.7	6.7
	....	7.2*	7.2*	7.2*

* With high compression head.


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AIRBRIEFS

By ROBERT McLARREN

Rentzel Air Czar

U. S. aviation is fortunate to have Delos W. Rentzel as the new Chairman of the Civil Aeronautics Board and Chairman of the Air Coordinating Committee, a dual role which makes the big Texan virtual czar of U. S. civil aviation. Likable, friendly and extremely able, Rentzel has gained the personal regard of the President and, under the present administration, is assuredly on the way up into the upper administrative circles of the Government. However, the workings of party politics are often such that successful administrators are "promoted" into more and more difficult and unpopular assignments until their talents for arbitration and friendly counsel between warring factions are strained and broken. Rentzel takes over a thoroughly disorganized and dispirited Government agency so ensnarled in red tape as to strain the talents of a professional business consultant. The Civil Aeronautics Board, with a virtually impossible range of sometimes mutually-exclusive duties (the creation of Civil Air Regulations and the investigation of accidents resulting therefrom, etc.) has gotten itself thoroughly discredited during the past few years due to its top-heavy staffing by lawyers and the near-absence of experienced aviation men either on the Board itself or on the top-level staff. As a result its thousands of cases have become so thoroughly appealed, consolidated, separated, re-opened and temporary-ordered (with the list of intervening parties reading like a small-town business directory) as to cause wonder that U. S. civil aviation operates at all. Happily, Rentzel is a vastly-experienced civil aviation man (principally in the communications field, for long years with American Airlines) who handles a DC-3 transport with a skilled hand. The admiring airline industry is certain to allow him a three-month breathing spell, while he attempts to reorientate Board policy. After that, only performance can preserve his many friendships. It is to be hoped that the new dual job is not the treacherous reef on which a promising young administrator has been navigated.

Korean Time Bomb

The relieved situation in Korea has followed the familiar pattern of both the European and Pacific theaters of World War II in which the collapse of the enemy came with blinding suddenness and at a point of seemingly inpenetrable strength. It attests again to the trying military patience needed with Air Power. It now seems apparent that Air Power's effects are long-delayed but eventually displayed with absoluteness unmatched by any other weapon. Thousands of tons of bombs and millions of rounds of ammunition can be expended by Air Power on an enemy for a period measured in months with absolutely no effect on the front line pressure he is able to maintain. Then the cumulative effect seems to appear everywhere as if on a given signal and the back of the enemy caves in. This delayed action effect is at once the frustration of blatent Air Power enthusiasts and confirmation of its opponents worst fears. It raises a serious question as to its potency in a "knockout blow" role claimed by its supporters, which is the avowed role in which the present Air Force leaders see it. Experience during the past ten years, at least, would indicate that it is anything but a "knockout blow" in the urgent sense of the word, but rather the slow yet irresistible cancer that eventually strangles the enemy. While this view has often been held of so-called Strategic Air Power (i.e., long-range bombardment), Korea, at least, would indicate that it is also true of Tactical Air Power (short-range interdiction). It is well known that fighter-bombers had laid waste every structure from Pusan to Manchuria as long as six weeks before the Allied break-through occurred. Supplies simply did not move southward, by day or night, in spite of the cleverest of ruses used by the Red Koreans, which radar refused to recognize. It would seem doubtful, based on this experience, that even the B-36-equipped Strategic Air Command can be recognized as a true "knockout blow" as the Air Force claims it to be. And we doubt if even the atomic bomb changes this timetable of delayed action very much.

For Peace or War

Washington powers insist repeatedly that Korea had little if anything to do with the present acceleration of mobilization. Secretary of Air Force Finletter stoutly insists that the new Air Force stepup in procurement building towards a 69-Group force was not directly influenced by the Korean war, that it was scheduled anyway on the basis of the over-all world political situation. Many of us don't see that there has been much change in the latter over the past five years. But we do note that Secretary of Defense Louis Johnson is now gone, that Stuart Symington is now in another post and that President Truman is noting

(*Turn to page* 106, *please*)

Variety of Problems Analyzed at

Aero Meeting

By R. RAYMOND KAY

WARTIME mobilization for production in the aircraft industry, relative merits of turbo-props and turbo-jets, *Los Angeles* human factors for maximum producibility, technical and general aspects of future air transportation were a few of the important subjects discussed at the SAE National Aeronautic meeting held in Los Angeles recently. In all, a dozen well prepared papers were read and discussed. The recent upsurge in activity in the aircraft industry throughout the nation occasioned a keen interest in the meeting and caused a good turnout from all parts of the country.

Facts derived from research have been added to the continuing discussion among engineers as to the comparative qualities of turbo-prop and turbo-jet powerplants for aircraft. A performance analysis indicates that, at an altitude of 30,000 feet, the basic turbo-prop engine gives a greater flight range than the turbo-jet at speeds up to 400 mph. At flight speeds of 400 to 500 mph the powerplants are highly competitive. At flight speeds above 500 mph the turbo-jet gives greater range. These facts were presented by Tibor F. Nagey of the NACA Lewis Flight Propulsion Laboratory.

Right there simple comparisons end, for when the turbo-prop engine is subjected to reheat or regeneration or regeneration-plus-reheat, things happen. At sea level, regeneration-plus-reheat reduces fuel consumption by about 10 per cent. At 30,000-foot altitudes, the reduction in fuel consumption is about seven per cent. At any altitude a 100 per cent reheat between turbines gives a 10 per cent improvement in flight range at low speeds, and 15 to 20 per cent greater ranges at high speeds. Furthermore, the flight range of the basic turbo-prop engine can be increased by raising the inlet temperature. A 25 per cent increase in inlet temperature extends the flight range by 32 per cent.

A prediction that passenger transport flight at speeds faster than sound will be technically feasible within the next ten years or less, and may become economically practical within that time was made by Edward C. Wells, Boeing's Airplane Company's Engineering Vice-President. He said that within the next five years the aircraft industry can build airplanes capable of crossing the Atlantic non-stop at speeds 200 to 300 mph faster than present-day transports.

Based on predictions made by aircraft and engine designers in SAE meetings, Wells gave what he described as a composite view of industry thinking on what this new transport would be like. It would have a cruising speed of at least 500 mph, would operate at between 35,000 and 40,000 feet altitude over a range of 3500 miles with a payload capacity

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of 50 or more passengers. As to the choice of power plant for the transport of the future, Wells would choose the turbo-jet because of its relative simplicity, all other things being equal. Both turbo-jet and turbo-prop engines should be developed, however, with equal vigor because "there are transport jobs for both types to do."

Maintenance of the American patent system, described as the best in the world, was advocated by W. R. Lane, Patent Counsel, North Amer'an Aviation, Inc. Suggesting that the patent system requires some clarification, and possibly revitalization, Mr. Lane called for legislative action to establish a clear definition of invention.

Studies of the effect of icing upon aircraft powerplants for the purposes of developing adequate protection are being conducted atop Mt. Washington, New Hampshire, it was reported by P. M. Bartlett, Bureau of Aeronautics, and T. A. Dickey, Naval Air Material Center. They said the location is ideal, with winter weather extending from October to April icing conditions prevalent 25 per cent of the time, and wind exceeding 50 mph most of the time.

Work has concentrated on jet and turbine engines for these powerplants are particularly susceptible to icing. The three year old operation, known as "Project Summit," is carried on jointly by the military and powerplant manufacturers. Today, every major axial flow gas turbine engine, both turbo-jet and turbo-prop, now in production or in development stages in this country is equipped or will shortly be equipped with anti-icing system. Some aircraft now in operational status and most aircraft in experimental status are now equipped with anti-iced engines. In addition, these engines are capable of operation in icing conditions more severe than most aircraft wing anti-icing systems are capable of operation.

Solar Aircraft Co.'s afterburner was displayed for the first time at the Aircraft Engineering Display. This afterburner, currently in production for naval type aircraft, is used with the Westinghouse J34 turbo-jet engine rated at 3200 lb thrust. This engine and afterburner combination, which gives the engine a thrust rating in excess of other much larger engines, is the first to be employed on production aircraft in this country, according to a company executive.

Twenty-five national manufacturers exhibited their products. Exhibitors were: Aeroquip Corp.; Axelson Manufacturing Co.; AiResearch Manufacturing Co.; Stratos Corp.; Angle Computer Div., S & D Enginering Co.; Fafnir Bearing Co.; Chiksan Co.; Kelite Products; Barber Coleman Co.; Bobrick Manufacturing Co.; Vickers Inc.; Hydro-Aire Inc.; Lear Inc.; Hi-Shear Rivet Tool Co.; Westinghouse Air Brake Co.; Aeroproducts Div., General Motors Corp.; Cleveland Pneumatic Tool Co.; Jack & Heintz Industries Inc.; Pacific Scientific Co.; Western Gear Works; Minneapolis-Honeywell Regulator Co.; Pacific Airmotive Co.; Solar Aircraft Co.; Scintilla Magneto Div., Bendix Aviation Corp.; Ryan Aeronautical Co.

Collyer Scores Diversion of Rubber to Russia

In a blunt statement, John L. Collyer, president, B. F. Goodrich Co., has proposed that large rubber producing countries who are either beneficiaries under the Marshall Plan or receiving American aid indirectly, should stop the sale of crude rubber to Russia and increase the supply available for the United States stock pile. He points out that shipments of natural rubber to the United States have been diminishing. Of the 102,000 tons shipped from Malaya in July, United States received only 27,000 tons and only 37 per cent of that country's production for the first six months of this year, compared with 55 per cent before World War II. Meanwhile, he said Russia has been acquiring a substantial quantity of crude rubber.

among vendors to auto makers the trend is to . . .

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One reason for the trend is that several large auto makers have already requested that vendors ship parts in collapsible welded-steel-wire baskets with eight-way pallet bases. They have specifically named CARGOTAINERS because they are the foremost and basic-patented product of this type. Auto makers are constantly looking for new ways to save time and money, just as you are. They have come to appreciate the value of receiving, storing, and adding products to the assembly line in CARGOTAINERS . . . . . then easily collapsing the CARGOTAINERS and sending them back to the vendor or their own intraplant supply point. *For details on how the CARGOTAINER system can simplify your own handling problem and save you money, write without any obligation to Pittsburgh Steel Products Company, Dept. AI, Grant Building, Pittsburgh 30, Pa.*

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Business in Brief

Written by the Guaranty Trust Co., New York, Exclusively for AUTOMOTIVE INDUSTRIES.

General business activity in mid-September continued at a level substantially above that of a year ago. Increases during this period were reported in bituminous coal production, construction, electric power production, and railway freight loadings, while department store sales and crude oil production declined slightly from their recent high levels. For the week ended Sept. 16, the *New York Times* index of activity stands at 162.5, as compared with 159.9 in the preceding week and 140.8 a year ago.

Production of bituminous coal and lignite in the week ended Sept. 16 is estimated at 11,300,000 net tons, 1,234,000 more than the output in the week before, and 2,795,000 above the comparable amount last year.

Civil engineering construction volume reported for the five-day week ended Sept. 28, according to *Engineering News-Record*, was $244.8 million, slightly more than the $238.9 million of the week preceding and 49 per cent above that of the similar period of 1949. The total recorded since the beginning of the year, at $8.9 billion, is 46 per cent more than that in the corresponding period of 1949.

Electric power production rose slightly during the week ended Sept. 23. At 6457 million kilowatt-hours, total output was 16.2 per cent above the amount a year earlier, as compared with an advance of 15.6 per cent shown in the preceding week.

Railway freight loadings during the same period totaled 870,196 cars, 0.5 per cent more that the figure for the week before and 31.6 per cent above the comparable number recorded a year ago.

The dollar value of department store sales in the week ended Sept. 23, as reported by the Federal Reserve Board, was equal to 321 per cent of the 1935-39 average, as compared with 367 in the week before. At this level, the value of sales was 10 per cent more than in the comparable week of last year. The total reported since the beginning of the year was five per cent more than the corresponding sum in 1949.

Crude oil output in the week ended Sept. 24 averaged 5,894,050 barrels daily, 44,280 less than in the preceding week but 1,051,500 more than production in the comparable period of last year.

The wholesale price index of the Bureau of Labor Statistics during the week ended Sept. 19, at 169.7 per cent of the 1926 average, was 0.4 per cent higher than in the preceding week and 10.2 per cent above the corresponding figure for 1949.

Member-bank reserve balances rose $400 million during the week ended Sept. 27. Underlying changes thus reflected include increases of $906 million in Reserve-bank credit, $490 million in Treasury deposits with Reserve banks, $21 million in money in circulation, and $6 million in Treasury cash. Declines of $51 million in the monetary gold stock and $20 million in nonmember deposits and other Federal Reserve accounts were also reported.

Total loans and investments of reporting member banks increased by $712 million during the week ended Sept. 20. An advance of $187 million in commercial, industrial, and agricultural loans was recorded. Total business loans, at $15,517 million, were $2228 million more than the comparable sum a year ago.

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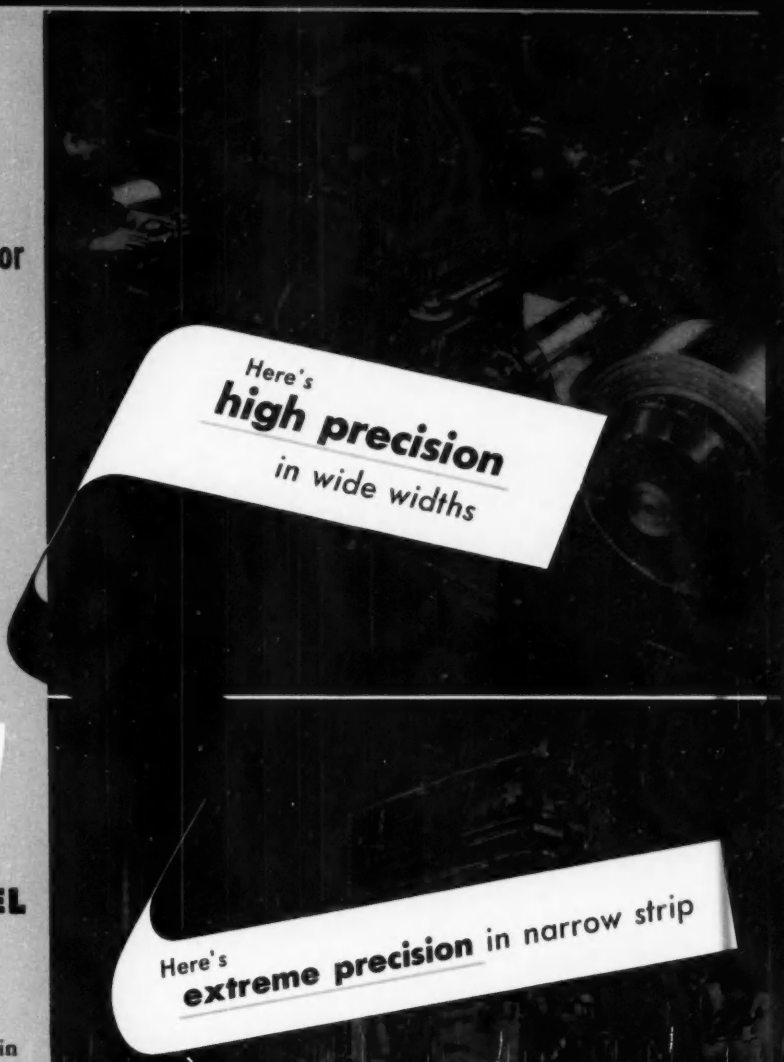

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DODGE—"It takes a good premium gasoline to give reliable service 100 miles a day. That's what I average, and I find that New Blue Sunoco fills the bill." THOMAS G. MANLEY, QUINCY, MASS.

BUICK—"When I tried New Blue Sunoco in my 1950 Roadmaster, I got smoother performance, quicker get-aways, new anti-knock power." LEONARD G. POLINOFF, PROVIDENCE, R. I.

CHEVROLET—"I've never seen anything like a tankful of New Blue Sunoco for quick get-away—even on a long tough hill. When you put your foot down on the accelerator, you know what's going to happen." HERBERT ARONOWITZ

CADILLAC—"I've been getting better mileage since I changed to New Blue Sunoco. For my money it's a better buy than any of the premium gasolines I ever used." ARSEN NAJAVIAN, WORCESTER, MASS.

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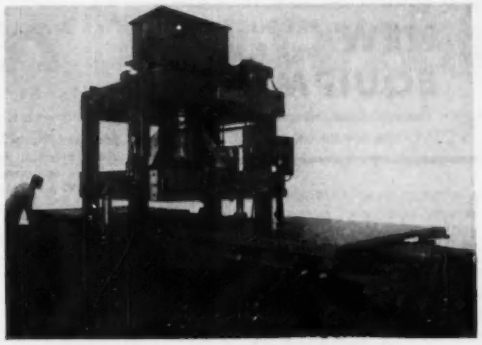


Farrel - Birmingham automobile mat trimming press

M-50—Automobile Mat Trimming Press

A 125-ton capacity, 84 in. by 96 in. hydraulic press designed for increased efficiency in trimming automobile mats of the currently used larger sizes is offered by the Farrel-Birmingham Co., Inc. of Ansonia, Conn.

The automatic, cyclical motion of the press platen and the two tables provides time for removal and placement of stock on one table while stock on the other table enters the press, is trimmed, and withdrawn. Press and tables are hydraulically operated by separate, electrically driven pumping units. These, with the oil tank, are mounted on the top crosshead. Inching motion of any one unit is obtained by a selector switch.

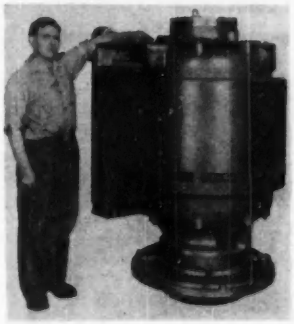
The tables, which operate on antifriction bearing rollers, are surfaced with ground, hardened steel plates. Adjustable deceleration of table movement assures smooth, controlled action.

The reciprocating cylinder has radial ribs extending over the platen area to provide reinforcement against deflection. The upright supports are steel slabs, and other heavy parts of the press, including the ground and polished 18 in. diam ram, are of cast Meehanite metal.

Other design features include an arrangement for quickly changing the knife setup, outside packing of all rams, adjustable guides on the moving platen, and safety controls to stop all motion.

M-51—Vertical Spindle Surface Grinder

Recently completed by Mattison Machine Works, Rockford, Ill., and now in



Size of the Mattison 100 hp motor indicated by the figure of a man

NEW PRODUCTION AND PLANT EQUIPMENT

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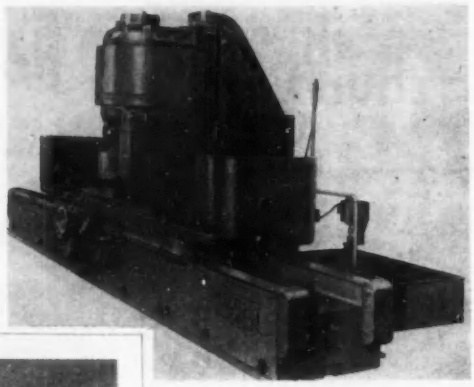
operation in an automotive plant for the reconditioning of large size dies, a No. 400S vertical spindle surface grinder is equipped with a 100 hp motor, believed to be the largest ever used in connection with a grinder of this type.

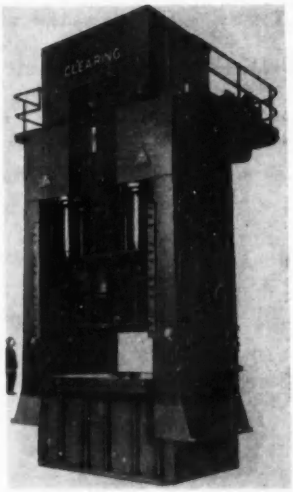
The built-in grinding wheel motor is mounted on a heavy column, gibbed to one flat and one vee way. Power control raises or lowers the wheel head, which is also provided with hand and automatic feeds. Reciprocal movement of the table is controlled hydraulically, with speeds adjustable up to 90 fpm. The table travels on a bed of such length that the table never overhangs the bed, even in extreme end positions.



Mattison No. 400S vertical spindle surface grinder equipped with 100 hp motor

M-52—Double-Action Hydraulic Presses

A line of heavy double-action hydraulic presses now being manufactured by the Clearing Machine Corp. of Chicago, Ill., provides two independent hydraulic circuits, one for the blankholder slide and the other for the punch slide, each with its own separate pump. This arrangement precludes possibility of losses in blankholder pressure during



Clearing double action hydraulic press with two independent hydraulic circuits

Hot water thermostat and component parts—Courtesy Camstat, Inc., Los Angeles, Calif.

Seven Copper Alloys Resist Corrosion in Bi-Metal Switch

Rusting and other forms of corrosion change the electrical characteristics of parts, decrease strength of springs and jam bearing points in small control instruments.

To combat such conditions, copper-base alloys were primarily selected for all functional parts in the illustrated water heater thermostat. This unit operates with a bi-metal actuator which curves forward as the result of one metal expanding more rapidly than another.

Since each copper alloy has different mechanical and physical characteristics, seven were used in this unit, and, in some cases, several tempers for each alloy.

Cartridge brass, 70% copper and 30% zinc, because of its ability to withstand heavy working better than high brass, is used for the cover (1), bracket (2), pointer (4), yoke (9), and staple (3). Half hard metal was necessary to permit drawing, forming and bending of the cover, pointer and yoke, and in the staple to permit the prongs to be bent at assembly. The bracket is spring hard (8 numbers) as it acts as a flat spring.

Phosphor bronze Grade A, 95% copper, 5% tin, 0.15 phosphor, produces flat springs in light gages (0.006 and up) due to its excellent spring properties and resistance to fatigue. This alloy is used for the contact springs (16), push button spring (17), spring link (18) and flat spring (20). All have spring temper.

Nickel Silver Grades A, B

Two grades of Nickel silver find use in this unit. In the pivot bracket (8) grade B, 55% copper, 18% nickel and the remainder zinc, gives the part fine spring characteristics, high strength (better than 90,000 psi in its extra hard temper), and the ductility in this hard state to permit heavy bending and forming.

Grade A, 65% copper, 18% nickel and remainder zinc, has greater ductility than B which permits dimpling, bending and forming on the actuating lever (10). The base metal is hard (4 numbers) and has a tensile strength of 85,000. The coldworking done on this lever increases its strength to around 90,000.

Several Parts Machined

Free machining brass rod, with the highest machinability of the copper alloys, can be accurately machined with good finishes at high speeds. For these reasons, it is used for the counterweight (shown on assembly 9), adjusting nut (5), terminal (6), stub (7), and calibrating screw (12). This alloy also has a conductivity 26% that of copper.

The hollow rivets (11) and (13) are produced in cold headers from 70-30 (cartridge brass) wire. When the hollow rivets are such that drilling is required rather than extrusion in the header, a light leaded wire is used (65% copper, 0.3% lead and remainder zinc) to facilitate the drilling.

The cold headed and roll threaded screws (14) and (15) are made from high brass, 65% copper, 35% zinc. Although not as ductile as the cartridge brass used in the hollow rivets, it is sufficiently ductile for medium-sized heads and roll threading.

Silver Rivets

The hollow rivets used for electrical contacts in the switch under the silver links are also of silver to eliminate danger of arcing.

Bridgeport's laboratory can be of help to product engineers in the selecting of the best alloy from a functional as well as fabricating standpoint. Write the nearest district office or contact Bridgeport directly.

NEW PRODUCTION AND PLANT EQUIPMENT

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the punch stroke. The pressure on each corner of the blankholder may be individually adjusted, making the presses ideal for eccentric or irregular draws besides the more regular runs. The hydraulic circuits use valves for reversal, insuring quick return and accurate control of pressure.

A feature of the presses is provision for slowing the punch slide at the instant the blankholder slide is picked up on the return stroke, this action eliminating the shock customarily encountered when the punch slide picks up the motionless blankholder. Positive drive for both slides allows the gibbing to be set closely, helping work accuracy.

The extended gibbing of the punch slide in the crown is advantageous when eccentric loading conditions are anticipated. The punch slide gibs are adjustable within the blankholder slide while the blankholder itself is guided by deep gibs which may be regulated to compensate for wear.

The Clearing press illustrated, installed in a leading aircraft manufacturing plant, has a 72 in. by 108 in. bed and is arranged for an 18 in. draw and lift out, including redraw work using an inside blankholder. The presses are available in any required size, and are suited to short run or high production work.

ECA Countries Selling Tools to Red Nations

Although this country cut off shipments of machine tools to Russia and its satellites about two and a half years ago, European countries financed by ECA aid are selling such equipment to those countries, according to Tell Berna, general manager of the National Tool Builders Association. A list of the countries engaged in selling to Russia and other governments in the Russian orbit, he said, are England, France, Italy, and West Germany. He pointed out that ECA helped finance machine tool production in Italy, and that today there are more companies making lathes and drilling machine there than in the United States. He said also that American military authorities in West Germany were permitting shipment of machine tools to Russian satellite nations by machine tool industries which were financed by American dollars. He said that his organization has protested to the government and the armed forces without result.

New BESLY Grinder...

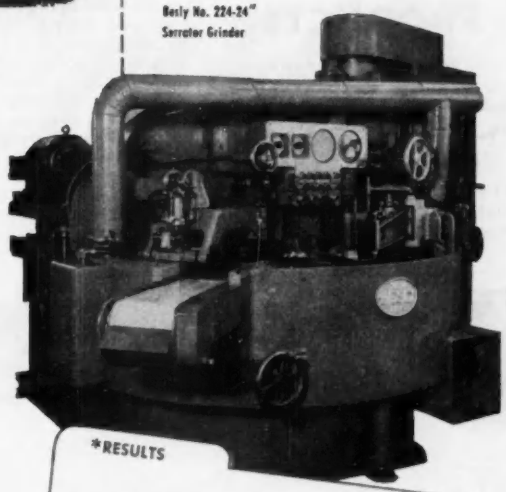
...turns out

15,000

serrated

ledger plates

per 8-hr. shift!



Besly No. 224-24"
Serrator Grinder

RESULTS like these are your pay-off for choosing BESLY

***RESULTS**

. . . 15,000 serrated ledger plates every 8 hrs.

Hardened plates are bevelled and serrated in one operation at the rate of 32 per minute in this new automatic-feed Besly No. 224-24" Serrator Grinder. Finished sections are serrated at the same rate. Besides much faster production, these results have been realized: greater uniformity—less noise—fewer rejects—less time loss for wheel dressing. Change-over time for various size units is reduced to *seconds!*

***RESULTS**

. . . 329 gear cases per hour—tolerance .005"

Gear cases are 18" in diameter x 6¼" thick. Stock removed, 1/32" thick. Both faster production rates and closer tolerances are achieved. This new Besly No. 372 Vertical Spindle Roto-Rotary Wet Grinder has 72" abrasive wheel and 4 spindles. Each working station holds 2 castings.

***RESULTS**

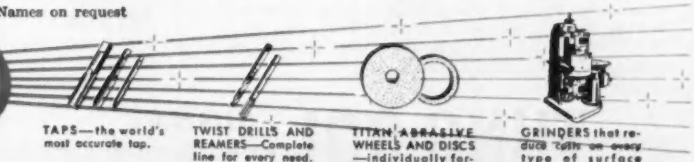
. . . 2400 wrenches per hour—300% increase

Quality markedly improved—all four surfaces accurately ground—ends free from taper. This Besly Double-Spindle Wet Grinder has magnetic vibrator and automatic chain feed. Only one pass through grinder is necessary.

Call in the man with the grinder facts—the Besly engineer. Let him tell you—frankly—whether Besly can cut *your* grinding costs. Also, he may be able to show you operations where a change-over from another process to grinding can substantially reduce production costs. Such a survey costs *you* nothing—but it may mark the beginning of lower costs . . . better, more accurately finished parts . . . increased output . . . or all three of these for you . . . just as it has for scores of other companies. Write us today!

*Names on request

BESLY



TAPS—the world's most accurate tap. TWIST DRILLS AND REAMERS—Complete line for every need. TITAN ABRASIVE WHEELS AND DISCS—individually formulated for your job. GRINDERS that reduce costs on every type of surface grinding.

CHARLES H. BESLY & COMPANY • 118 N. Clinton Street, Chicago 6, Illinois • Factory: Beloit, Wisconsin

NEW PRODUCTS

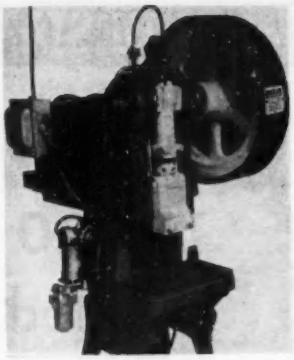
For additional information please use coupon on page 54

P-79—Oil Mist Lubricating System

Oil Mist, a system of constant and automatic delivery of lubricating oil to all types of machine bearings in airborne microscopic particles through tubing, has been announced by the Alemite Div., Stewart-Warner Corp., Chicago, Ill. Economy in lubricant consumption and prolonged bearing life are high spots among the Alemite claims for the product.

The Oil Mist lubricator, attached to each machine, is slightly smaller than the oil filter on a passenger automobile. In operation, there are no moving parts, and only two controls are used. One control is a built in air pressure regulator, while the other is a needle type valve which controls the flow of oil.

In the operation of the lubricator, dry clean air must be employed, so Alemite has provided a new water separator that is self-emptying, without interruption while in use, and is said to remove 98 to 99 per cent of moisture from the air.



Alemite Oil Mist system installed on a mechanical press. Unit shown, lower left

In one machine tool application, an automatic drilling machine, one unit lubricates 20 points, including cam, quill, worm and gear, reduction gear, gear and rack, gear train, plain and ball bearings. This machine, in a test extending over several months, used but one oz of oil for each eight hr of operation, drawing less than one cu ft of air per min at 10 psi.

P-80—Electric and Gasoline Hand Trucks

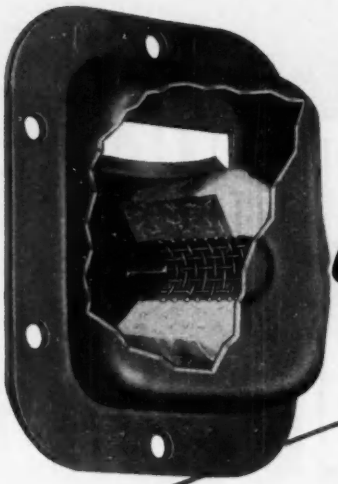
Hand trucks in two power types but of one basic design have been added to the line of materials handling machines produced by Clark Equipment Co., Battle Creek, Mich. One of the new trucks, the Electro-Lift, is battery-powered with motor drive; the other, the Hydro-Lift, is gasoline engine-powered with hydraulic pump and motor drive.

Trucks provide short turning radius and wheelbase for maneuverability, motor mounted in the drive wheel, ample underclearance to prevent "hanging up," and large brakes, me hanical self-energizing.

The battery-powered Electro-Lift is driven by a new GE compound motor which develops 1¼ hp. Automatic acceleration prevents overloading of driving motor and dumping of loads, and provides a smooth, swift get-away. The motor maintains almost uniform speed on levels, whether the truck is loaded or empty; and is reported to have extraordinary power reserve for ramp work. Soft, dynamic braking is effective automatically when the operator takes his hand off the control button, affording smooth deceleration which protects the load.

The control panel provides two points of power in each direction; and a walking beam in the control head makes it

(*Turn to page 76, please*)



For CLEAN Gear Oil...

$6.95

LIST PRICE

Equip your transmissions with inexpensive Fuller Transmission Oil Filters—easily installed on all Fuller Transmissions and most other makes. The new Fuller Filter keeps gear box oil clean between changes. Normal pressure of rotating gears forces the oil through a cleansing filter element and returns it to the gear box. Clean oil saves wear and tear on moving parts—saves you money on parts, labor and down-time. Write for more information.

Fuller TRANSMISSION OIL FILTER

FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO 13F, MICHIGAN

Unit Drop Forge Division, Milwaukee 1, Wis. • WESTERN DISTRICT OFFICE (SALES & SERVICE—BOTH DIVISIONS), 1060 E. 11th Street, Oakland 6, Calif.

ESNA's revolutionary new fastening device

—Replaces Tapered Pins...Grooved Pins...

Why?

How?

BECAUSE ROLLPINS ARE:

- . . . CHEAPER TO INSTALL
- . . . LIGHTER IN WEIGHT
- . . . VIBRATION-PROOF
- . . . RE-USEABLE

Rollpins are a new-type, pressed-fit fastener. Chamfered ends permit fast, easy insertion of Rollpins with the use of either hand tools or automatic jig assemblies. Compressed as they are driven into place, Rollpins exert constant pressure against the hole walls—stay permanently in place until deliberately removed with a drift or pin punch.

. . . AND THE INGENIOUS SLOTTED CYLINDRICAL DESIGN ASSURES . . .

- Reduced wear on parts assembled.
- Minimum shear strength exceeding cold rolled pins of equal diameters . . . and an overall reduction in weight of assembled unit.
- Lowered production costs through elimination of reaming and peening operations . . . because Rollpins are self-locking within the tolerance spread of standard production drilled holes.

Rollpins are made from either Carbon Steel or Stainless Steel (also from Beryllium Copper on special order) . . . and are readily available from stock in sizes (diameters) from 5/64 to 1/2 inch and in standard lengths. For full information and test samples, fill in and mail the coupon at right today.

SIMPLIFIED VIBRATION-PROOF ASSEMBLIES • REDUCED WEIGHT

NEW PRODUCTS

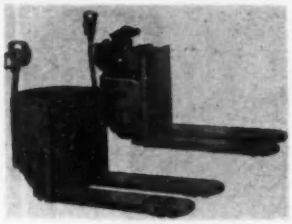
For additional information please use coupon on page 54

(*Continued from page* 72)

impossible to direct current to the motor in both directions at once. When reversing direction, the walking beam assures that controls will pass through neutral, then first point of power in the other direction before the second point of power becomes available.

In the compact hydraulic lift system the pump motor, pump, reservoir, relief valve and control valve are designed in one unit with a single line running to the lift cylinders.

In the Hydro-Lift truck the hydraulic motor is mounted in the same manner as is the electric motor in the Electro-Lift truck—in the 14-in. drive wheel, with the output shaft driving through a reduction to an internal gear in the wheel.



Clark Electro-Lift battery-powered hand truck with motor drive and Hydro-Lift gasoline engine-powered hand truck with hydraulic pump and motor drive

The gas engine drives a hydraulic pump of eccentric vane type with infinitely variable displacement from zero to 15 gallons per minute. Displacement responds automatically to pressure requirements, the delivered volume of oil increasing as pressure decreases.

The pump in turn drives a constant displacement hydraulic motor of vane type with a sequence valve. Hydraulic pressure keeps the vanes in contact with the case at low speeds. It is claimed that the motor develops 90 per cent of full torque below 10 rpm.

Automatic torque multiplication provides ample reserve power when needed, the truck being said to possess exceptional ability for ramp work. The eccentric pump makes it impossible to stall the engine; and a unique valve linkage to the throttle provides fingertip reversing.

The Hydro-Lift engine is 2-cylinder opposed type, air cooled, and rated at 5.5 BHP at the governed speed of 2800 rpm. A mechanical governor and fuel pump are standard equipment. Both models are rated up to 6000 lbs. load capacity.

P-81—Three Coat Mica Base Paint

Given the name "Coastal Finish," a three-coat mica base paint system inaugurated by Westinghouse Electric Corp., Transformer Div., Sharon, Pa., is said to have double the life of standard finishes. Each coat functions cooperatively with the others to withstand the oxygen, acids, salts, and alkalis found in seacoast and in industrial atmospheres. In production the coats are baked on for speed. A modification of this finish permits air dying when necessary.

Pigments of the prime or first coat are primarily zinc chromate and iron oxide. The vehicle of the intermediate coat is composed of modified phenolic and alkyd resins. Pigment of this coat is composed of selected mica flakes which overlap, "shingle roof" effect. Final coat, tintable any color, is composed of resins and pigments which enhance the weathering resistance of the other two coats and screen out the ultraviolet of sunlight.

SEVEN STRONG REASONS

Appreciation of its many advantages explains the trend to N-A-X HIGH-TENSILE steel by manufacturers of commercial vehicles.

- HIGH STRENGTH
- HIGH FATIGUE RESISTANCE
- GOOD FORMABILITY
- FINER GRAIN STRUCTURE
- GREAT IMPACT TOUGHNESS
- EXCELLENT WELDABILITY
- HIGH CORROSION RESISTANCE

MAKE A TON OF SHEET STEEL GO FARTHER
Specify—

N·A·X
HIGH-TENSILE STEEL

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N-A-X Alloy Division, Ecorse, Detroit 29, Michigan

NATIONAL STEEL CORPORATION

BOOKS . . .

THE INELASTIC BEHAVIOR OF ENGINEERING MATERIALS AND STRUCTURES, by *Alfred M. Freudenthal,* 587 pp., pub., *John Wiley & Son, Inc.* This text marks a novel approach in the field of engineering analysis, recognizing that the study of the nature and behavior of engineering materials seldom progresses beyond the level of elementary theory of elasticity and strength. In the light of modern scientific concepts one must take into account a consideration of the structure of materials and their engineering response interpreted in terms of structural changes under the applied forces and conditions. The introductory chapter discusses reasons for studying mechanical behavior and examines basic concepts and definitions. Parts A and B develop the theory of general deformational behavior of engineering materials. Part C takes up selected problems of the mechanics of inelastic continuum, design of structures, and mechanical testing. Designed to provide a better background for engineering students, the book should prove of equal benefit to practitioners of the art.

MEN *in the* NEWS

(*Continued from page* 25)

promotion of **George Gabriel** to assistant plant manager has been announced.

The Riverside Metal Co.—The appointment of **E. A. Cabble** to the post of Market Research Analyst has been announced.

Shakeproof, Inc.—**John S. Hawley** has been appointed marketing manager of the company, a division of the Illinois Tool Works.

The Glenn L. Martin Co.—The appointment of **Edward J. Creswell** as Labor Relations Director has been announced.

Chase Brass & Copper Co.—The Board of Directors has elected **Robert L. Coe,** now President, to be Chairman of the Board; **Richard C. Diehl,** formerly General Manager, of the Steubenville, Ohio plants of the Wheeling Steel Corp., has been elected President.

Publications

(*Continued from page* 54)

L-96 Rubber Data Handbook

Acushnet Process Co.—In a new 32-page handy reference book, the company's extensive facilities and products are fully illustrated. The booklet is designed for easy reading and quick reference. Three sections describe plant, products and give data; this section includes methods of molding, specifications, case histories, etc.

L-97 Cycle Annealing

Surface Combustion Corp.—A new bulletin, well illustrated, describes the metallurgical background and process equipment for modern cycle annealing. Annealing treatments for typical steels are presented together with their chemical compositions, hardness values, etc.

STROMBERG

CARBURETORS

Performance

Is a Prime Factor in Every Automobile Sale!

Engine performance not only influences *today's* customers, it also builds a reputation which effects *future* sales. Thus, it is doubly important to specify engine components that will maintain your standards of quality and service. In carburetors that means Stromberg.

Exclusive design features, and mechanical simplicity have made Stromberg* Carburetors famous for *lasting performance*. Judge on the basis of *long-range economy* and you will agree—Stromberg Carburetors are the logical choice.

*REG. U. S. PAT. OFF.

ECLIPSE MACHINE DIVISION OF Bendix AVIATION CORPORATION

• Standard Equipment Sales: Elmira, N. Y.
• Service Sales: South Bend, Ind.

Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, N. Y.

NIAGARA PRESENTS

a complete new line of

SOLID ONE-PIECE Steel Frame Presses

Straight Side, Double Crank

Made in sizes up to the maximum that can be shipped on a freight car. (Larger sizes are four-piece tie rod construction).

Furnished with Niagara Air Actuated, Electrically Controlled Sleeve Clutch on sizes up to 6½" shaft. Plain or single geared, single end drive.

Furnished with Niagara Pneumatic Friction Clutch on sizes 4½" to 12" shaft. Single geared or double geared, single, end or twin drive.

Made in lengths up to 96" between gibs. (Longer lengths are tie rod frame construction).

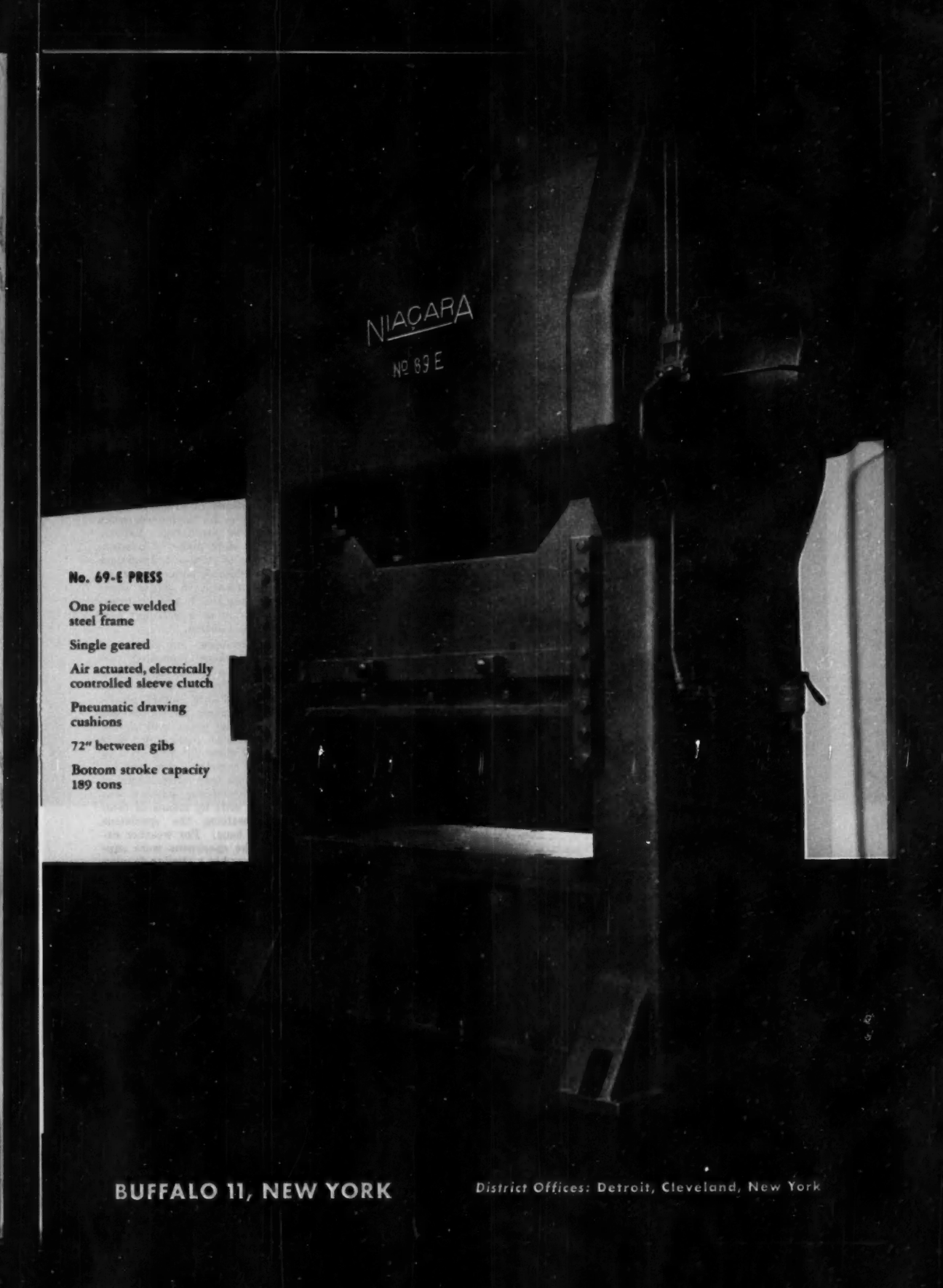
Niagara Pneumatic drawing cushions available.

Write for specifications on sizes to fit your requirements.

MANUFACTURERS OF

Presses, Shears, Machines and Tools for Plate and Sheet Metal Work.

NIAGARA MACHINE AND TOOL WORKS,



No. 69-E PRESS

One piece welded steel frame

Single geared

Air actuated, electrically controlled sleeve clutch

Pneumatic drawing cushions

72" between gibs

Bottom stroke capacity 189 tons

BUFFALO 11, NEW YORK

District Offices: Detroit, Cleveland, New York

Stress Corrosion Resistance of Wrought Magnesium Alloys

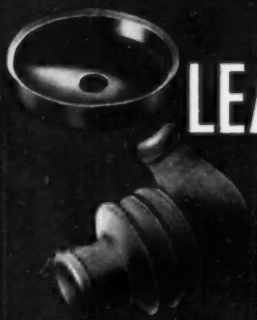
MAGNESIUM alloys, because of their lightness, high strength-to-weight ratio, easy machinability, and good weldability, are being used to an increasing extent in the fabrication of electronic equipment, aircraft parts, portable gangplanks, auto trailers, and numerous other articles. While comercial magnesium alloys are usually resistant to ordinary kinds of atmospheric corrosion, they may corrode seriously in certain industrial atmospheres or along the sea coast, especially if they are in direct contact with salt water. To learn more about the suitability of these materials for aircraft use, the National Bureau of Standards, at the request of the Bureau of Aeronautics, Department of the Navy, has conducted an extensive investigation of the resistance of wrought magnesium alloys to corrosion under stress both in a marine atmosphere and an inland atmosphere.

The Bureau's investigation included both sheet and extruded alloys. The sheet materials were the Ml, AZ31X, AZ51X, AZ61X alloys and a clad alloy in which a core of AZ31X sheet was sandwiched between two thin layers of the Ml alloy; extrusions studied were the ZK-60, AZ61X, AZ80X, and AZ80X-HTA. Except ZK-60, which is a Dow Chemical Co. designation, all designations are ASTM. The tests were made with ½-in. reduced-section standard ASTM tension specimens for sheet metals, except that the grip ends were one or 1¼ in. wide, when possible, instead of the standard ¾ in. The purpose of this added width was to minimize the failure of the specimens due to stress corrosion around the bolt holes. The specimens were exposed to the weather stressed in tension at the National Bureau of Standards in Washington and on a platform built out over the tidewater so that they were exposed in a marine atmosphere at Hampton Roads, Va. Unstressed specimens were subjected to the same corrosive conditions in order that the effect of stress in increasing corrosion damage could be evaluated. Laboratory tests also were made by continuous immersion of stressed specimens in a sodium chloride-potassium chromate solution (NaCl, 35 g per liter; K_2CrO_4, 20 g per liter) and by intermittent immersion in a 0.01 per cent sodium chloride solution.

Specimens stressed by means of weighted levers were supported vertically in the test solutions in cells made of 60-mm Pyrex cylindrical tubes fitted at each end into slotted plastic disks. Rubber gaskets placed between the plastic and the glass, and rubber stoppers molded with rectangular slots slightly smaller than the grip ends of the specimens, completed the cell assemblies. For the intermittent immersion tests, the corroding solution was raised into the cells by means of compressed air, wetting the specimens four times per hour. For weather exposure tests, the specimens were supported and stressed in a similar fashion but were left exposed to the atmosphere. Breaking of a specimen under stress automatically opened a knife switch in the circuit of a solenoid counter actuated once every six minutes by a clock. The time required for failure of the specimens was thus recorded in units of 0.1 hr. Threshold stresses, defined as the maximum stresses that materials can withstand without failure when continuously immersed in the corroding medium for a fixed period of time, were determined as a measure of corrosion resistance in the sodium chloride-potassium chromate solution. Resistances to stress corrosion in intermittent immersion and weather exposure tests were evaluated from exposure periods to failure at given stresses.

In general, the susceptibility of mag-

(*Turn to page* 85, *please*)

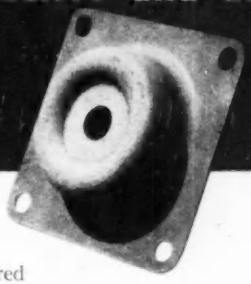


LEATHER specially tanned and treated

plus most precise **ENGINEERING**

make **SIRVIS PRODUCTS**

completely effective and dependable



Sirvis leather boots and packings are manufactured to highest standards of quality. They provide maximum sealing and protection for many different types of vital machine parts and are widely known for giving uniform, dependable service under extremely difficult operating conditions.

For detailed information about Sirvis products, write for the Chicago Rawhide Catalog.

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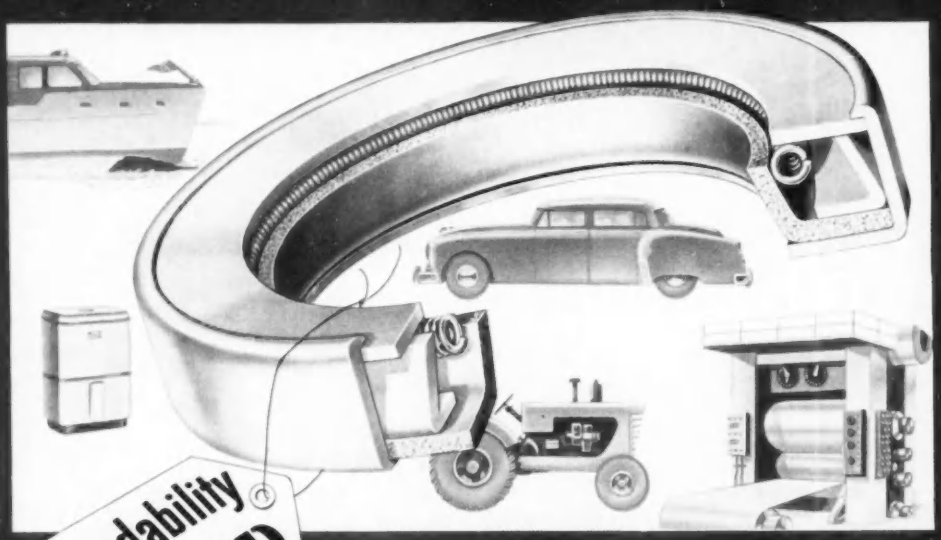
Chicago Rawhide Manufacturing Company specializes in mechanical sealing and protective products: oil seals and special diaphragms, boots, gaskets, washers and packings of *Sirvene* synthetic rubber and *Sirvis* mechanical leather.

SIRVIS



Dependability PROVED

C/R SIGNIFIES superior oil seal performance, proved in thousands of difficult applications over a period of 30 years.

de·pend'a·ble (dĕ·pĕn'dă·b'l) adj. Worthy of being depended on; trustworthy; reliable.

This very minute, the dependability of millions of C/R oil seals is being proved again. Just as it has been day in and day out for over thirty years. All leading automobile manufacturers have used C/R oil seals consistently during that period. The leading farm implement manufacturers, too, find C/R seals completely trustworthy under all operating conditions. The story is similar in every field—aircraft, machine tools, rolling mill equipment, marine equipment, home appliances and many others. Over and over again the reliability of C/R seals has been *proved in use* as well as in exhaustive laboratory tests.

Today, more manufacturers of automotive, agricultural and industrial machinery rely upon C/R oil seals than any other shaft type sealing device.

C/R's reputation for dependability is outstanding. Based upon an exclusive record of experience and research, it has made Chicago Rawhide the world's largest manufacturer of shaft type oil seals. When you specify C/R oil seals for your product, you can be sure of the highest standards in dependable, trouble-free service.

CONSULT! For the solution of your particular sealing problem, Chicago Rawhide engineering service is always available.

ENGINEERS: We will be pleased to send you engineering data on "Perfect" Oil Seals on receipt of your written request.

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Chicago Rawhide Manufacturing Company specializes in mechanical sealing and protective products: oil seals and special diaphragms, boots, gaskets, washers and packings of *Sirvene* synthetic rubber and *Sirvis* mechanical leather.

PERFECT Oil Seals

nesium alloys to stress corrosion in the weather increased with aluminum content up to about 6.5 per cent of aluminum. It was found that specimens stressed at the Washington, D. C., weather exposure site failed in shorter periods of time than those exposed to the same stress in a marine atmosphere. On the other hand, damage to unstressed specimens at the Washington site was small as measured by losses in tensile properties. Thus, the AZ31X-h material, after being exposed unstressed for 750 days, had a tensile strength of more than 94 per cent of that of the unexposed material, and its elongation was still more than 85 per cent of the original value.

Of all the materials studied, the Ml-clad AZ31X-h alloy was the most resistant to stress corrosion. Specimens of this alloy were exposed in a marine atmosphere, stressed to 30,000 psi (90 per cent of the yield strength), for 500 days without failure.

Among the bare alloys, the Ml-h sheet and the ZK-60 extruded material were outstanding in stress-corrosion resistance. After 1175 days of exposure to the weather at Washington, D. C., under a stress of 16,000 psi (55 per cent of yield strength) the Ml-h sheet alloy had not failed. First failures of the ZK-60 extruded material exposed at the same locality under a stress of 20,000 psi occurred only after 580 days, while specimens of this alloy stressed to 18,000 psi had not failed in more than 1010 days.

Of the remaining alloys, the bare AZ31X-h material proved the most resistant to stress corrosion. However, specimens of this material stressed to 16,000 psi (about 50 per cent of the yield strength) and exposed to the weather at Washington failed after an average exposure period of only 151 days. The AZ51X, AZ61X, and AZ80X alloys were all susceptible to stress corrosion when exposed outdoors under stresses of 20,000 psi or more. The extruded AZ80X material was more resistant to stress corrosion in the heat-treated and aged condition (AZ80X-HTA) than in the as extruded condition.

Canada's Car Makers Having Biggest Output Year

Canadian automobile makers are having their biggest production year in history, a survey of major firms showed. There was no clear explanation of the reason, but the firms, most of which are located in Ontario, reported that they were getting more orders than they could fill. GM of Canada reported that its Oshawa plant had turned out over 100,000 cars and trucks since the first of the year, more than the total production for the entire 12 months of 1949. A GM spokesman said that an unprecedented production schedule was being maintained in an all-out effort to keep pace with "the almost insatiable demands" of the motoring public.

Operating Characteristics of Roller Bearings

A dependable bearing to carry radial loads at extreme speed, and preferably to operate at high ambient temperatures, is desirable for use as the turbine-support bearing in gas-turbine-type aircraft propulsion units, where gravity loads generally under 1000 lb and DN values (product of bearing bore in mm and shaft speed in rpm) to 1 x 10^6 are presently encountered, as well as for other high-speed applications. It is desirable to know the operating characteristics and limitations of conventional rolling-contact bearings at high speeds and how these characteristics and limitations may be improved and extended by such means as improved lubrication methods and design modifications.

A preliminary investigation was conducted at the Lewis Flight Propulsion

(*Turn to page 86, please*)

Laboratory of the National Advisory Committee for Aeronautics to determine experimentally the operating characteristics of conventional cylindrical-roller bearings at high speeds. Three types of bearing were studied, the main difference being in the cage construction. The three types are used interchangeably in aircraft gas-turbine engines and are of 75-mm bore, 130-mm OD, and 25-mm width. Seven bearings were tested. The ranges of controlled variables were as follows: DN values from 0.3×10^6 to 1.65×10^6 (4000 to 22,000 rpm), and static radial loads from seven to 1613 lb. Oil at 100 F was supplied to the bearing under investigation by means of a single jet of 0.089- or 0.180-in. diam directed at the space between the cage and the inner-race flange except in two cases where twin jets, each of 0.100-in. diam, were on either side of the bearing. External heat was not applied to the bearing housing or the shaft. Data from the rear turbine bearing of a commercial gas-turbine engine operating at maximum speed (DN value, 0.86×10^6) are included for comparison with the bearing data from the test rig.

From this experimental investigation and analysis of the results the following data were obtained:

1. Bearing operating temperatures were much more sensitive to changes in speed than to changes in load except in the low-load range. The temperature of a loaded roller bearing was found to increase approximately linearly with an increase in speed; however, the temperature of an unloaded roller bearing increased at a rate greater than linear, presumably due to slippage within the bearing at the higher speeds.

2. Of the seven bearings investigated, three incipient failures occurred. Two failures were of roller-riding cage-type bearings and the other of an inner-race-riding cage-type bearing. The maximum DN value reached was 1.4×10^6 for the first failures and 1.65×10^6 for the other failure.

3. The test bearings were found to undergo changes in operating characteristics with running times in that at a given operating condition the inner- and outer-race temperatures and the cage speed varied as the operation progressed.

4. The operating temperatures of the three types of bearings were found to differ most in the low-load, high-speed range where the roller-riding cage-type bearing exhibited significantly lower operating temperatures than the one- and two-piece, inner-race-riding cage-type bearings. The operation of the roller-riding cage-type bearing was considerably rougher, and the bearing showed prohibitive roller and cage wear after relatively short high-speed operation (DN values over 1×10^6), as compared to the inner-race-riding cage-type bearings.

5. In general, the percentage of slip within the bearing increased with an

(*Turn to page* 88, *please*)

INCREASED BEARING EMBEDABILITY

means

INCREASED BEARING LIFE

DUREX-100 ENGINE BEARINGS

There's a very substantial reason why the greater embedability of Durex-100 engine bearings is a whole lot more than just a manufacturer's claim.

The proof is in the matrix. In Durex-100 bearings, the depth of the babbitt overlay *plus* the much greater depth of the matrix provides far more embedability than is found in conventional type bearings, where embedability is limited to the thickness of the babbitt alone.

And only Durex-100 bearings are constructed by Moraine's unique method of bonding. First, a layer of copper and nickel metal powder is applied to the steel back. These particles are then bonded together by a sintering process to form a porous matrix integrally brazed to the steel back. When the high-lead babbitt is cast, the molten metal penetrates the pores of the matrix, and thus is bonded mechanically, as well as metallurgically, to the matrix.

The unmatched high properties and consequent superior durability of Durex-100 have been confirmed in tests . . . proved in use. These *different* engine bearings are found in Cadillac, Buick, Oldsmobile, GMC, and other important makes of cars and trucks as original equipment. They can probably be used to advantage in the engines you manufacture, too—so why not get the whole story on Durex-100 from Moraine today?

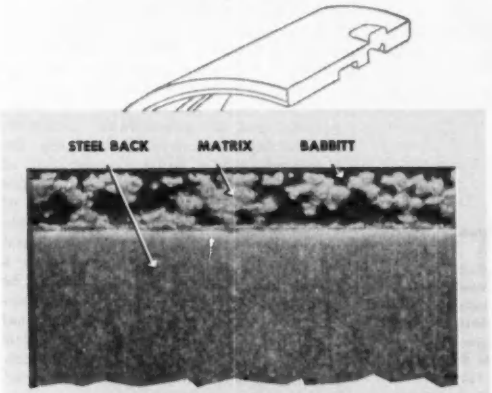


PHOTO-MICROGRAPH OF CROSS SECTION OF DUREX-100 BEARING. MAGNIFIED 33 TIMES

THE MATRIX MAKES THE DIFFERENCE

Steel-backed intermediate matrix of porous copper-nickel bonds mechanically, as well as metallurgically with thin high lead babbitt overlay.

MORAINE PRODUCTS
DIVISION OF **GENERAL MOTORS**
DAYTON, OHIO

Durex-100 Engine Bearings by Moraine

increase in DN value and decreased with increase in load, reaching average values greater than 60 per cent slip at DN values from 1.35 x 10^6 to 1.65 x 10^6.

6. Under certain operating conditions, namely moderate speeds and loads (that is, DN values in the range 0.3 x 10^6 to 0.7 x 10^6 and loads in the range 100 to 1100 lb), the inner-race-riding cage-type bearing operated with a cage speed greater than the theoretical value, which indicated that the cage and rollers were driven by the cage-locating surface rather than the cage being driven by the rollers. This condition was not observed for an equivalent bearing having a roller-riding cage.

7. A circumferential temperature gradient existed around the outer race of the turbine roller bearing of an aircraft turbine engine; this gradient was qualitatively similar to that obtained in the bearing rig in that the maximum temperature occurred in the region 270 F to 300 F after the oil-jet location; whereas the minimum temperature occurred in the region 60 F to 90 F after the oil-jet location in the direction of shaft rotation.

8. Although considerable slippage occurs at high speeds and light loads for the cylindrical roller bearings investigated, there was little evidence of follower wear in the bearings that did not fail. It is therefore postulated that there may exist a hydrodynamic film of oil between rollers and raceways under such operating conditions.

Effect of Humidity on Performance of Turbojet Engines

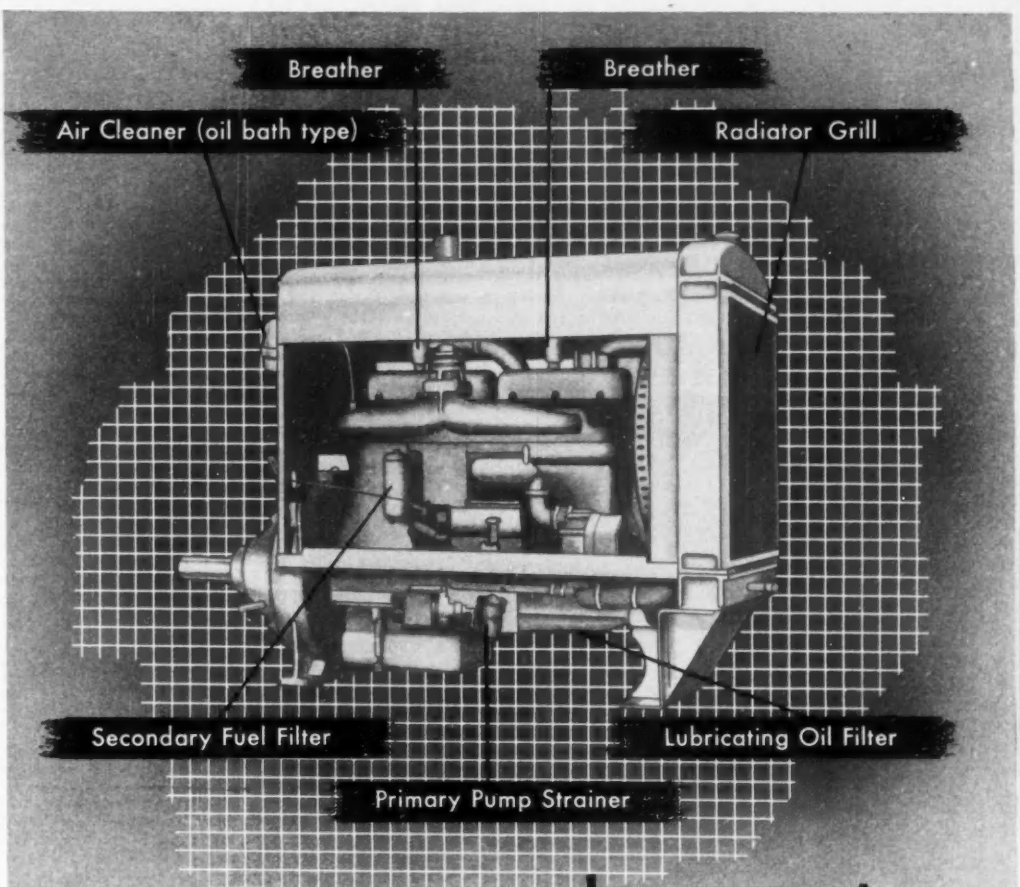
THE usual generalized performance parameters for turbojet engines are obtained by assuming that the thermodynamic properties of the working fluid are constant. This assumption leads to some variation in performance of engines under widely differing humidities.

The performance of turbojet engines in air of varying humidity has usually been obtained through a detailed cycle analysis of a representative engine, which accounts for variations in the thermodynamic properties of the working fluid with humidity. The ratio of the performance in dry air so that in moist air is then defined as a humidity correction factor. Correction factors derived in the detailed type of analysis are inconvenient in their application and are inherently restricted to a particular engine.

In an investigation conducted at the National Advisory Committee for Aeronautics Lewis laboratory, and reported in Technical Note 2119, correction factors are developed that may be used for precise correlation of data where performance is affected by some of the thermodynamic-property variations due to atmospheric humidity. Humidity correction factors are developed from a direct consideration of the generalized engine performance parameters. In this manner, a set of humidity correction factors are obtained that are approximate but do not involve parameters associated with a particular engine; hence they may be applied to any engine to correct performance for humidity. An additional advantage of this method of analysis consists of the greatly simplified calculations used to obtain humidity correction factors.

The humidity correction factors of the detailed method as applied to two different turbojet engines are compared with each other and with those of the approximate method. In addition, the results of an experimental investigation conducted on a turbojet engine in a variable-humidity altitude chamber are presented to verify the theory.

The humidity effect on performance was small. Experimental results showed that thrust was affected most and that for a given engine speed this parameter decreased 3.6 per cent for a variation in specific humidity from 30 to 210 grains of water per lb of dry air.



wire cloth

FOR DIESEL POWER UNITS

1950 marks fifty-two years of American Diesel development. Four years before Adolphus Busch built the first American Diesel, Horace Reynolds started the first wire cloth factory west of New York state, in Dixon, Ill. Today's modern Diesels would not have been possible without the parallel development and application of component parts and assemblies in which woven wire cloth plays an important role. By promoting engine reliability and economy, Reynolds Wire Cloth is helping Diesel power units to set new records for low power costs. Reynolds more than fifty years of wire weaving experience is at your disposal.

Reynolds Industrial WIRE CLOTH

REYNOLDS WIRE CO.
DIXON, ILLINOIS

Latest Advances in the Cast Iron Field

(*Continued from page* 43)

more manganese unless the sulphur can be eliminated prior to pouring the castings.

Due in part to the shortages brought about by the world situation, deterioration in quality of raw materials, increased labor costs, and in part by the advent of nodular iron, there has been the greatest interest in improvement of foundry methods and in better equipment and processes. Many of these developments are beyond the experimental stage and are being placed into production. The purpose of these improvements is to lower costs, improve uniformity and control, and to combat the lower quality of raw materials. A short discussion of these problems follows.

Many of the cokes supplied have poor strength, poor ability to transmit carbon to the metal, poor burning characteristics, and high sulphur. High sulphur in the iron not only requires more manganese but also reduces the fluidity of the molten iron. For example, an iron containing 0.05 per cent sulphur has over double the fluidity of an iron containing 0.12 per cent sulphur as measured by a standard fluidity spiral. If nodular iron is to be produced from a molten iron containing 0.12 per cent S a larger amount of the nodularizing alloy has to be added. A troublesome slag is formed in the ladle which is most difficult to remove.

Many gray iron foundries reduce the sulphur by means of sodium carbonate but the residual sulphur is usually 0.06 per cent at best. For nodular iron a sulphur under 0.035 per cent is highly desirable. Sulphur has been reduced to the latter figure in Europe by using a slag and a lining high in limey or basic constituents in the cupola. This represents a wide departure from American practices. A foundry in the South has done extensive development work to adapt such a cupola to American production. Some of the large foundries supplying the automotive industries are seriously considering the adoption of this equipment.

For the production of high quality, high strength irons, high molten iron temperatures are required. It is difficult in many cases with some of the cokes on the market to secure high temperatures and maintain high production as well. To help this situation, preheating the air for combustion is beneficial. Although preheaters of various types have been used for some years past, many new installations have been made this year. The newer equipment in many cases will preheat the air to 1000F as compared to 300 to 400F in the past and may later be operated at even higher temperatures if economical to do so.

Another major problem which was not foreseen several years ago is that of smoke and fume abatement. Various civic and government bodies have pointed out that foundries not only give off large quantities of smoke and fine ash but also when fluorspar is used as a flux, give off fumes which are highly detrimental to plant life. Stringent ordinances have been passed in some cities which may make it imperative in the near future for foundries to redesign their equipment completely.

Where desulphurization is carried on with soda ash and where iron is treated for nodularizing with magnesium alloys, disagreeable fumes are produced. These must be carried off by fans.

Newer cupolas have been built, and are in order, which are capped so that no gases exit directly to the atmosphere. These gases are conducted to chambers where the heavier solid particles are removed, then the heat is extracted and transmitted to air used for combustion. The cooled spent gas is

(*Turn to page* 92, *please*)

BORG & BECK

BORG & BECK CLUTCH · THE STANDARD

ENGINEERING B·W PRODUCTION

then stripped of the remaining dust by electrostatic precipitation or by scrubbing with water before the gas is vented to the atmosphere.

Another new development in the industry is the so-called Croning process for molding. A metal pattern is preheated to about 350-400F and packed with a fine sand containing a powdered plastic material. The heat of the pattern cures the plastic bond for a depth of about one-eighth inch. When the pattern is removed it is found to be coated with a layer of bonded sand. This layer is removed, further cured by heat, and placed in a flask and surrounded by cast iron shot. The purpose of the shot is twofold: it forms a dense, solid backing for the mold and it has a high heat conductivity so that a more rapid cooling rate is induced in the casting. Where this process is adaptable, the faster cooling rate promotes solidity, reduces the wastage of gates and risers, and requires less labor as compared to sand molding. However, the process has not been found applicable to all types of castings. A description of the Croning process appeared in the April 15, 1950, issue of AUTOMOTIVE INDUSTRIES.

BOOKS . . .

OUTLINE OF RADIO TELEVISION AND RADAR *(Symposium)*, published by *Chemical Publishing Co.*, Brooklyn, N. Y. Price $12.00. Containing more than 500 diagrams, charts, and circuits, this book gives the fundamental principles upon which radio, television and radar depend. Apparatus used and the various applications are explained, and the newest developments in television and radar are covered. A number of typical receiver circuits are illustrated and explained in detail.

SYMPOSIUM ON EVALUATION TESTS FOR STAINLESS STEELS—Special Technical Publication No. 93.—This Symposium presents a critical appraisal of some of the testing methods in regular use for evaluating certain corrosion-resistant characteristics of stainless steel alloys. Following an extensive Introductory Summary, with detailed table of solutions used to detect sensitization, comparison of results of evaluation tests, and other pertinent data including a five-page table of effects of stress relief and stabilizing anneals on corrosion, the following subjects are covered: Present Knowledge of Low-Carbon 18-8; Corrosion Resistance and Properties of Low-Carbon Austenitic Steels; Accelerated Corrosion Testing of Weldments; An Appraisal of Methods for Evaluating Corrosion Resistance; Tests for Intergranular Susceptibility; Influence of Carbon and Molybdenum on the Intergranular Corrosion Resistance; Comparative Corrosion Resistance in Various Acids; Comparison of Plant Corrosion Test Results with Huey and Strauss Tests; Some Plant Corrosion Tests of Welded Steels; Testing Multiple Specimens in a Modified Boiling Nitric Acid Test. Copies of this 236-page book, heavy paper cover, can be procured from the *American Society for Testing Materials*, 1916 Race St., Phila. 3, Pa., at $2.50 each.

Power for a "Powerhouse!"

"CATERPILLAR" DW20-W20
New Diesel wheel-type tractor and wagon, designed for high-speed, high-capacity earth moving in zoned operations.

When "Caterpillar" engineers designed their sensational new DW20 high-speed earth-movers, they looked about for batteries able to meet "Caterpillar" specifications . . . among the most exacting in the industry. Their approval of Globe batteries is a tribute to the quality of these power-units, and to the split-second starting, "spinning-power" and rugged dependability for which Globe batteries are known 'round the world.

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Materials Data

(*Continued from page* 41)

place across the larger section of the link, starting from the region of stress concentration. In this case the deleterious effect of the notch was more than sufficient to offset the advantage of the larger section. If in this particular application service failures started from stress concentration, test loads higher than 3500 lb would lead to fallacious conclusions no matter how tempting it might have been to apply them in order to duplicate "severe" field conditions.

In cases where past experience does not offer a clue as to the type of failure the safest procedure is to establish a complete curve, such as shown in Fig. 5. Almen[2] emphasizes the significance of the sloping portion of the fatigue curve in estimating the service performance of the material.

Although fatigue testing is usually the most reliable method for arriving at the service applicability of a material, in some cases a more indirect approach might be used. Consider, for example, the problem of a cylinder block cracking in service. The specific cause may not be evident, although residual stresses trapped during the casting process, rather than the operating stresses, are suspected. In this case a fatigue test will be of little value, and, instead, a determination of the residual stresses may provide the solution. Stresses can be measured first in the blocks fabricated in the same manner as those which failed. Casting procedure may then be modified and stress measurements repeated on blocks newly cast. Generally, if residual tensile stresses are decreased an improvement in the performance of the casting can be anticipated.

The measurement of residual stresses involves placing wire strain gages in the region where residual stresses are anticipated, connecting the wires to a Wheatstone bridge and balancing the bridge. The casting is then sectioned, thereby relieving the residual stress, which in turn unbalances the bridge. The amount of unbalance is a measure of the residual stresses originally trapped in the casting. A good discussion of this problem is given in reference No. 4. The procedure need not be restricted to castings, but can be applied equally well to forgings.

A common cause of high residual stresses is the cold straightening process, as applied to crankshafts, axle shafts, etc. Because of distortion due to quenching, shafts are straightened to bring them within the allowable runout. If the straightening is done cold, as is usually the case, the process induces tensile residual stresses as high as 120,000 psi. This in turn reduces the fatigue strength by 30 per cent.

A method for measuring residual stresses due to straightening is shown in Fig. 6. For a comparative study of the effectiveness of various processes in inducing residual stresses, strain gages are placed on a cylinder and connected to a bridge which is initially balanced. By boring out the material in successive steps until a thin shell remains residual stresses are relieved, which unbalances the bridge. The amount of unbalance is a measure of stresses initially trapped in the cylinder.

In this manner data such as shown in Fig. 7 can be obtained. It is doubtful whether such data can be projected directly into design, first, because the stresses shown reflect only the conditions existing in the specimens tested, and, second, because residual stresses and operating stresses are not directly additive. The information is of value, however, in indicating the relative effectiveness of various materials and processes.

Increasing attention is being given lately to the analysis of fractures as a means for determining the cause of service failures. From the appearance of the failed part one can often determine whether the part failed as a result of bending, torsional or axial loads; whether the failure was due to


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is the waterproof carburetor*
on the Army's "Eager Beaver" trucks,
built by Reo Motors, Inc.
*Note the Snorkel air intake.
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stress concentration or to an insufficient section; and what was the approximate magnitude of the load responsible for failure.

The vast majority of service failures are fatigue failures caused by loads which, if applied only once, would not be detrimental. By virtue of repetition, however, a minute crack is formed which propagates itself until the remaining portion is not sufficient to withstand even a single load and the part breaks instantaneously.

The face of the fractured part consists, therefore, of two zones: 1) smooth, velvety fatigue zone; and 2) a coarse and crystalline instantaneous zone, as shown in Figs. 8 and 9. Sometimes the crack originates simultaneously at several points on the surface. As these individual cracks propagate they join to form final fracture. The radial lines of juncture of these cracks are known as "beach marks."

The relative position of the instantaneous zone often offers a clue as to the loading condition responsible for failure. Thus, the concentric circular instantaneous zone well inside the fatigue zone in Fig. 9 shows that the part was subjected to a severe stress concentration superimposed on a high service load. On the other hand, the elliptical instantaneous zone displaced from the center of fracture, as in Fig. 8, shows that the loads responsible for failure were low. Furthermore, by multiplying by means of a suitable relation the area of the fractured zone and the tensile strength of the material the order of magnitude of the loads responsible for failure can be ascertained.

As valuable as all of the above tests are, it would indeed be a bleak future if every time a new problem arose we would have to resort to tests to arrive at a solution. Here lies the value of projecting data derived from one set of problems into a new situation. This should be approached, however, with some caution as evident from the following example. Considerable information is available in literature as to the effect of shot peening on the fatigue strength of machine parts. Some of the data are expressed in terms of life and values up to several hundred per cent improvement are not uncommon. It is evident from Fig. 4 that a several hundred per cent improvement in life under one condition of loading may be only a few per cent improvement under a different load. Thus, unless loads are the same in both cases the test data may not be applicable to the new problem. If, instead, test data are expressed in terms of strength rather than life, as in Fig. 10, they will be more readily applicable to new designs. The dashed line indicates a trend which for many design problems is of a sufficient accuracy to determine the improvement expected from shot peening.

It is obvious from the foregoing discussion that because of the multiplicity of factors affecting the strength of materials no single test, no matter how thorough and complete, will offer a wholly reliable index for design. However, of all the physical and metallurgical tests known at present a test on actual components, reinforced by the measurement of the operating loads, is the best approach to the problem.

References

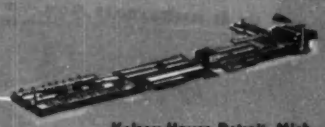
[1] **The Relation of Fatigue to Modern Engine Design.** R. A. McGregor, W. S. Burns and S. Bacon, Northeast Coast Institute of Engineers and Shipbuilders Transactions, vol. 51, Jan. 1935, p. 183.

[2] **A Method of Detecting Incipient Fatigue Failure.** H. W. Foster, Proc. Soc. Exp. Stress Analysis, vol. IV, No. 2, p. 25.

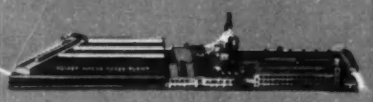
[3] **The Useful Data to Be Derived from Fatigue Tests.** J. O. Almen, Metal Progress, August 1943, p. 254.

[4] **Symposium on Testing of Cast Iron with SR-4 Type of Gage.** A.S.T.M. Special Publication No. 97.

in 7 great plants serving the automotive industries of the United States and Canada



Kelsey-Hayes Detroit, Mich., McGraw Plant



Kelsey-Hayes Detroit Mich., Military Plant

Kelsey-Hayes Plant in Davenport, Iowa

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Die Cast Clutch Housing

(*Continued from page* 33)

were measured, using SR-4 strain gages. A dynamic setup, similar to the one shown in the illustration, was arranged to produce an unbalanced load at the rear end of the transmission case. SR-4 resistance wire strain gages, Brush strain analyzers and a Brush recorder measured the value of the stresses involved during the tests.

Following the tests under service conditions, static breakdown tests were carried out on a Baldwin Southwark testing machine to establish the actual load carrying capacity of the sand cast housing. Construction of the die-casting die had been carried through the preliminary stages and could now be completed with a certain degree of finality.

After the casting die was completed and a sample production run of housings reached an accepted level of quality, the testing program that was carried through on the experimental sand casting was duplicated on the aluminum die casting. As a result of the laboratory and road test indications, minor changes were then made on the casting die permitting the initial production run to be made.

To ascertain the quality of the product, a final set of breakdown tests was run on the die cast housings. Shear load and bending load limits were determined, and a fatigue test based on a 1000 lb eccentric load was made. These tests showed the die cast housing to be equal or superior to an aluminum permanent mold casting for this application.

Static Breakdown Tests on Die Cast Aluminum Housings

	Average
Shear load test—Fig. 1	10,600 lb
Bending load test—Fig. 2, at location of universal joint	2,450 lb
Fatigue test—Fig. 3 Based on a 1000 lb eccentric load	12,500,000 cycles with no failures

These tests show that the die cast housing carried about 25 per cent greater shear load in the breakdown test, about 10 per cent higher load in the bending test with a 19-in. arm, before failure and had a fatigue life when subjected to a 1000 lb eccentric load at least 100 per cent greater than the permanent mold cast housing.

The thousands of Nash automobiles now equipped with the new aluminum clutch housing represent an effective demonstration of the potentialities of modern aluminum die casting design and manufacturing methods. Extensive testing in a modern laboratory, well supplied with equipment to analyze the stresses, has substituted for the lack of experience with aluminum die castings for stressed applications in the automobile field.

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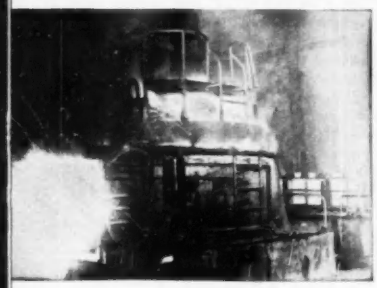
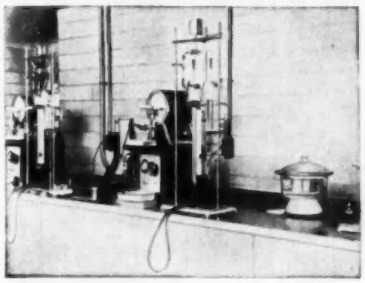
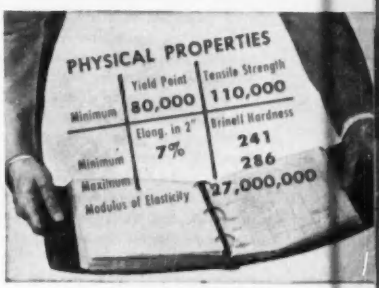
Automotive engineers may not be fully aware of the steadily advancing progress that has been made during the past 15 years in the development of Cast Alloy Steel Crankshafts. To supplement their information on this subject, this, and succeeding Progress Reports will present technical information on the development work that has been done by Auto Specialties Mfg. Co. on Cast Alloy Steel Crankshafts, their growing acceptance, and the accumulating evidence of their unique advantages for mass-produced motor car engines.

Progress report No.1 on the Application of Mass-produced Cast Alloy Steel Crankshafts to the solution of some of today's Engine Production Problems.







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Each Crankshaft carries its own heat number, making it possible to continue the quality controls throughout the processing. Typical control is this apparatus for analysis of carbon and sulphur, and the telautograph for reporting results. These carefully controlled processes result in physical properties suitable for multi-throw integral counterweighted crankshafts.

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  Engineers are practically unlimited, in designing Cast Alloy Steel Crankshafts to meet new engine high compression and high speed requirements.
- **REDUCED MACHINING COST**
  Elimination of rough cheeking operation, has reduced machining at least 70%.
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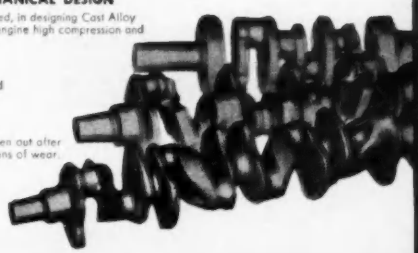
  Evidenced by examples of crankshafts taken out after 100,000 miles showing only slight indications of wear.
- **MINIMUM BEARING WEAR**
  Graphitical type metal employed provides an additional "inherent" lubrication to journals continuously.



CAST alloy steel CRANKSHAFTS

AUSCO

B5240

Materials Outlook

(*Continued from page* 45)

the result of recent sales of Government-owned facilities.

In the event of a more serious emergency, it is estimated that there is still another 150,000 tons of idle capacity in standby plants. But there are three bottlenecks to expansion beyond current planning—lack of power, lack of bauxite ore supplies, and inadequate supplies of caustic soda for processing the ore.

Of these, the ore supply is perhaps the least of the three worries although at present more than 60 per cent of American needs must be imported. A plentiful ore supply is seen from Jamaica, Guiana, and Brazil as long as shipping is not seriously disrupted. Power construction is progressing slowly but surely and labor trouble, the chief obstacle to caustic soda production, seems to have been settled for the moment.

Defense officials have tentatively estimated probable military aluminum needs for the current fiscal year at around 100,000 tons or slightly less than 15 per cent of current production rates. Some industry executives expect the figure to be nearer 20 per cent. Planned increase in primary output would take care of this but here again product mix enters the picture.

Drop forgings are seen as certain to be in tight supply and defense contracts will cut heavily into available sheet, bar and rod tonnages. For such civilian items as grain storage bins, builders will get a high priority on sheet needs (both steel and aluminum) for such orders as the recent one for 7500 aluminum containers.

Rubber has been, and still is, a critical item in mobilization for defense or war. As matters stand at the moment, indications are that there will be enough for all essential needs. Moreover, no drastic moves such as tire rationing seem to be in the cards in the foreseeable future but restrictions on the uses of new rubber are already in effect.

United States requirements for 1950 have been estimated at about 1.2 million tons or 100,000 tons a month. This includes civilian and military needs. An order restricting use of new rubber has already been issued and is expected to reduce consumption by perhaps 10,000 tons monthly. Still other action along this line is in the works.

Increasing shipments by Far Eastern producers to Iron Curtain countries has reduced this country's normal take of 55 per cent of world supplies. But this has been offset by returning Government-owned synthetic plants to production. Domestic capacity next year is expected to be around 675,000 tons. If the remaining standby plants were put into production it is estimated that domestic capacity could be stretched to about 900,000 tons or 75 per cent of current needs.

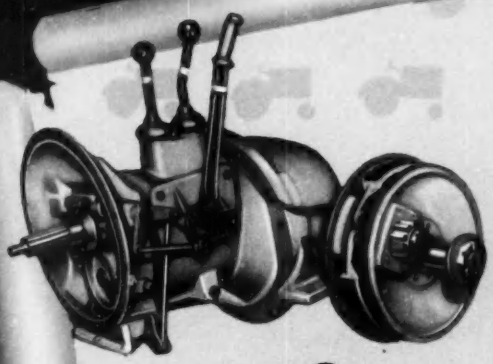
Because it is essential to such a variety of component parts, the tight copper supply is also as important as a limiting factor in production of automobiles, motors, planes, and machinery as either steel or aluminum.

About 50 lb of copper, brass and bronze are required to produce a so-called typical car. The amount actually ranges from 35 to 70 lb according to size and make. For instance, these metals are necessary to production of more than two-score parts, from rivets and bushings to radiators. The wiring system, for example, requires up to 4 lb of copper while between 3 and 4 lb of copper and copper alloys are to be found in a starter.

Following a slight seasonal letdown late last year, copper demand had remained at high levels so far in 1950. Sales of appliances and other electrical goods to wholesalers for the first six months of 1950 ran 10 per cent above last year and demand for other types of fabricated products using copper has

(*Turn to page* 103, *please*)

An excellent record



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1000-lb. FORK TRUCK

Here are the Reasons Why:

This machine embodies every desirable feature that experienced users have requested. It is the nearest approach yet to the ideal electric 1000-lb. fork-lift truck.

★ **Automatic Acceleration**—Automatically accelerated control is standard. First power point selected by directional control lever on steering column—successive points controlled through master switch, which in turn is controlled by an automatic timer. Guarantees even acceleration.

★ **Non-Plugging Controls**—Impossible to change direction until motor comes to full stop. Important safeguard to windings and other vital components.

★ **"Deadman" Safety Brake**—Brake sets automatically when the driver leaves seat; releases when seat is occupied. Combination parking brake and safety feature. Independent of service brake. Directional control lever also automatically *locks in neutral* when driver leaves seat.

★ **Independent Hydraulic System**—Separate motor increases lifting and tilting speeds about 80 per cent—gives drive motor big efficiency boost. Directional lift lever: pulled upward, it raises the forks; pushed downward, it lowers them.

★ **Greater Capacity**—Increased lift capacity and speed; increased travel speed. Simplified driving—finger-tip control; non-kick-back steering.

★ **Easy to Service**—Battery-compartment cover hinged at front for easy access—plug-receptacle conveniently mounted. All grease fittings within easy reach.

You'll want full information on this new "BEST BUY" in the entire field of Materials Handling. Get in touch with your nearby Clark dealer—you'll find him a capable counselor on your handling problems. Clark Elec-Trucloader literature will give you the facts in convenient form. Write for it, today.

CLARK ELECTRIC AND GAS POWERED FORK TRUCKS AND INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIV. CLARK EQUIPMENT COMPANY BATTLE CREEK 55 MICH.
REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE WORLD
AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

PRODUCTS OF CLARK—TRANSMISSIONS · FORK TRUCKS & TRACTORS · AXLE HOUSINGS · GEARS AND FORGINGS · RAILWAY CAR TRUCKS · ELECTRIC STEEL CASTINGS · AXLES · TRACTOR UNITS

been so strong that some producers have been forced to cut back production in end items.

Stocks held by domestic producers have been depleted with the level at mid-year standing at about 50,000 tons of refined copper compared with four times as much a year ago. Second quarter consumption this year ran at a rate of 125,000 tons a month against a domestic output rate of perhaps 75,000 tons. Import duties have acted to slow down copper from Chile, our chief source.

Copper scarcity has had an adverse effect on brass, some mills having been forced to reduce operations by either laying off workers or cutting down the workweek. The situation is seen as remaining tight for the remainder of 1950.

It is only of late that lead has also been seen as a probable scarce item. The total supply in 1949 was roughly about 790,000 tons; consumption was 580,000 tons, leaving some 210,000 tons for stockpiling and inventories.

Recently lead has been bought up as fast as it appeared on the market and the third quarter supply has been nearly as critical as that of zinc. However, indications were that although the indicated consumption rate was about 900,000 tons it was believed that some of the purchases were for building up inventories. If so, the inventory control order (NPA Reg. 1) should ease the situation.

The automobile industry actually requires only a small portion of the supply, about 17,000 tons, for direct use. But two related industries—battery manufacture and gasoline refining—require about 275,000 and 110,000 tons, respectively. This is roughly a third of total consumption on the 1949 basis.

Zinc shortages have been partly responsible for the tightening lead situation. Although the 1949 slab zinc supply exceeded consumption by about 170,000 tons, shortages have been building up since the first of this year. The 1949 supply was estimated at 870,000 tons against indicated consumption of a little more than 700,000 tons.

Nickel is another primary metal which has been growing shorter in supply and was at a critical stage by September. Most new customers were having to show a defense order to get supplies and old customers were taking cutbacks.

Stockpile buying has been stepped up and producers of alloys have been giving a cold shoulder to orders for steel calling for more than 3 or 4 per cent nickel. Reports to the Government indicate that the situation has been slowing down the production of stainless steel and must eventually affect nickel anodes and salts for plating.

In an effort to ease the situation, the Government is spending several million dollars for reopening the Nicaro plant in Cuba which has been idle since 1947. Its peak production, in 1946, was about 11,200 tons.

Although chromite and manganese are two materials of which very little is produced domestically, and both are classified as critical, there seems to be little immediate worry as to immediate essential needs.

Consumption of chromite ores apparently will run some 50,000 tons more than last year's 780,000. At the same time, the probable 1950 supply, though down slightly for early months, will not run less than the 1949 supply of more than 1.2 million tons.

Consumption of manganese ores in 1949 was about 1,330,000 tons against a supply of about 1,540,000 tons. While this leaves little margin for stockpiling and building inventories, at present new sources abroad are being developed —such as ECA helps to Turkey and Brazilian mines now being developed by American private interests. The latter are expected to begin shipping as much as 300,000 tons by 1952.

A less apparent threat concerns contributory materials such as caustic soda and soda ash. In addition to their importance to steel, aluminum, ordnance, and explosives, they are essential to the paint, varnish, glass, plastic, dye, rubber, soap and other industries. It requires 8 lb of caustic soda to produce 11 lb of rayon; it takes 2 lb of

(*Turn to page* 104, *please*)

soda ash to process enough bauxite for 1 lb of aluminum. Considerable production has been lost this year through strikes. Luckily, many industrial plants had reasonably good inventories and this has partially offset effect of the strikes. Also, substitutes have been used, when obtainable, and aluminum producers have developed ways to reclaim substantial portions of caustic soda to be used over and over again in refining bauxite ores for alumina.

Actually, no Government agency or group of agencies can provide more than a sketchy outline of the future supply picture. The National Production Authority has been consulting with industry, trying to find the answers and to decide what, where, and when controls are needed.

On a statistical basis, as previously stated, the overall supply situation should not be too serious except in the event of all-out mobilization which seems remote; but this means nothing to the individual manufacturer who even now cannot get enough copper, zinc, or other raw materials to meet current orders.

The encouraging turn in Korean events as October began has only added to the confusion within military departments. As previously stated, defense needs are estimated at between 10 and 15 per cent of production. If actual combat ends shortly, what revisions, if any, will be made in defense planning? The White House is committed to a policy of a large standing defense force with an annual expenditure of up to $30 billion. If the Korean affair is in hand after the elections, will Congress appropriate such sums? Or will it prefer to spread defense spending over a longer period, thus easing the annual cost and drain on materials? Thus the matter stands.

Metal Congress

(*Continued from page* 46)

An outstanding speaker will present a dynamic message fitted to the special requirements of industrial sales at two meetings. The industrial trade show problems will be considered at the first session, Sunday evening, Oct. 22. Panel discussions will follow the principal address, with prominent publishers and editors of trade media acting as the experts on the platform. The second meeting, Tuesday morning, Oct. 24, will be devoted to the broader aspects of industrial selling and marketing.

The success of the Economy Theater presentation during the 1949 Metal Show in Cleveland called for a repeat performance at this Chicago show. Exhibitors having films depicting techniques and methods which contribute to high productivity in plant operations will again have available the professional facilities for showing those films to an active and interested audience of technical, production and management men in the metalworking industry.

AIRBRIEFS

(*Continued from page 58*)

that November is very close by. Perhaps all of these things are coincidences. But the fact remains that the build-up started almost immediately upon able Thomas Finletter's assumption of office and was accelerated as these personnel changes took place.

The aircraft manufacturing industry is moving rapidly towards a war footing, and this time more wisely. Virtually all of the major manufacturers have already subcontracted major assemblies to somewhat lesser manufacturers and the industry is now thoroughly crisscrossed with such subcontracts. The entry of the Ford Motor Co. into the manufacture of the Pratt & Whitney Wasp Major engine is the first major alignment made with the automotive industry by an aircraft company and others are soon to follow.

Throughout all such militant mobilization moves, Finletter stoutly maintains that the Air Force is being built as a "peace force" in the hope that its striking power will deter Russia from its intentions. It is fortunate, however, that this "peace weapon" can also do double duty upon an instant's notice as a "war weapon," a very valuable two-headed coin in these days of international gambling.

That Simple Gas Turbine

Initial references to the aircraft gas turbine as the "simplest" of aircraft engines with "only one moving part" are certain to haunt the engine designer for years to come. The Air Force recently blandly noted that the first stage in the overhaul of its current turbojet engines at its huge Tinker Air Force Base is the removal of 109 accessory items. It also revealed that this "simple" new engine must be overhauled every 3-400 hours of flight time.

Meanwhile, the NACA Lewis Propulsion Laboratory is busily engaged on studies of turboprop engine systems making use of intercooling and after-cooling, regenerative auxiliary units, multiple turbines, etc. Ignition and electrical systems, water injection, afterburning, automatic throttle systems, etc., are already complex standard accoutrements of the turbojet engine. These growing complexities are always defended as natural consequences of engineering development directed towards increasing the power and efficiency of these units. While the number of individual pieces may still be something less than that of the high-powered piston engine, although the latter claims fewer different parts, both the maintenance and overhaul mechanics are willing to testify that the aircraft gas turbine has long surpassed the piston engine in complexity.

To War—Backwards

It has been argued for some 15 years that the rearward-facing seat was the safest since it provides support for the entire body from head to toe in the event of a crash or a sudden deceleration of an airplane. While admitting the advantages of such an arrangement, the commercial airlines have steadily resisted any change in this direction due to obvious passenger objection. But the Air Force, not nearly so concerned about passenger objection, is apparently preparing to fly its troops to war facing to the rear in future transports. It has awarded a contract to the Beech Aircraft Corp. for 600 rear-ward facing seats, obviously substantially more than a test quantity. In addition to the rearward-facing feature, the seats are stressed to withstand a load of 16 g, as compared to the standard 6 g requirement.

It is for this reason that the seats are not readily installable on current military transport planes, since floor fittings and supporting structure is not equipped to take the 16 g load. However, it appears certain that future

(*Turn to page 108, please*)

Pumps are Part of Automotive Progress

1925

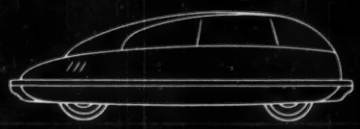
Lubrication

1950

Lubrication, Fuel, Windshield Wiper, Window Lift, Top Lift, Hydraulic Transmission.

19?

Lubrication, Fuel, Windshield Wiper, Window Lift, Top Lift, Rear Deck Lift, Hydraulic Transmission, Hood Lift, Seat Adjuster, Ride Control, Steering, Tire Jack, Brake Booster, Door Closer.



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EATON MANUFACTURING COMPANY

GENERAL OFFICES: CLEVELAND, OHIO

Pump Division

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AIRBRIEFS

(*Continued from page* 106)

transport aircraft ordered by the military will feature such rearward-facing seat installations. Following several years of this precedent, plus the mounting problem of future jet transport landing speeds, it seems probable that the commercial passenger may one day be watching where he has just been, instead of where he is going.

Double Talk

A virtually endless chain of high-ranking Air Force generals have delivered speeches, Congressional testimony and penned weighty technical articles on the general theme that the military transport airplane is a different breed of cat than its civilian counterpart and it was this thesis that prevailed against the so-called Prototype Bill right up to its final passage. Their arguments make good reading and good listening. But the record reads otherwise and the current air lift to Korea, like that to Berlin and throughout World War II, is being carried by the familiar Douglas DC-4, Boeing Stratocruiser and the immortal Douglas DC-3. General MacArthur is now flying about in a deluxe Lockheed Constellation, for which he traded his DC-4. Comes now Navy orders for the new Douglas DC-6 (R6D-1) and Lockheed Constellation (R70-1) standard commercial transport planes. The Douglas C-124, currently in production, is a modification of the commercially-conceived Douglas DC-7, the military C-74 version of which is seeing extensive active service. The big Lockheed R60-1 Constitutions are Navy-painted versions of a commercially-conceived postwar transport plane; the list is endless. Only the Fairchild C-119 Packet is a solely-military aircraft design in the large-capacity field. Even in the assault transport type, the Northrop C-125 was developed originally as a commercial transport. It would appear that the generals and admirals have been demanding one thing for five years while quietly buying quite another. It also appears that the commercial transport designers have produced some very rugged airplanes, which, while conceived for plush carpets and indirect lighting, still do a pretty job of hauling crates and supplies around when required!

Production Efficiency in Aircraft

(*Continued from page* 37)

assembly departments. However, this speedy method does not excuse it from final inspection as to quality and specification. With Quick Fix authorized to request assistance with top priority orders from necessary departments, the full cooperation of all insures a system that keeps the production line flowing on schedule.

Change Control

If there is one thing constant in the aircraft industry, it is change. The complexity of the airplane and the urgency of delivery schedules make it almost impossible to design initially and build all parts of a plane without certain refinements becoming necessary during production. It is most important that these continuing changes be properly controlled during production line operations or they can become a roadblock to economical, high-quality production which is geared to such an exacting manufacturing and delivery schedule.

At Douglas El Segundo it is the responsibility of the change control department to arrange for incorporation of all changes in production airplanes at proper effectivity points by the most economical methods, with minimum disruption, and with no delay in deliveries. This change control department reports to the superintendent of planning and tooling, but is physically located in the engineering system. This insures that

(*Turn to page* 110, *please*)

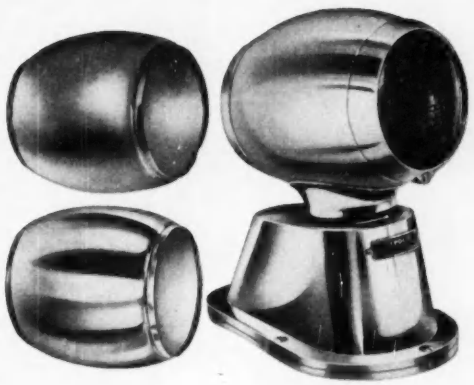
A LESSON IN SAVING—

Production Problem + REV-O-LITE ENGINEERS + REVERE = ELIMINATION OF COSTLY FORMING OPERATIONS, BRAZING AND EXTRA HAND FINISHING, PLUS FASTER PRODUCTION... AND AN IMPROVED PRODUCT

IN the development of their Rev-O-Lite, a revolving warning light for emergency vehicles, the Balford Corporation, Jacksonville, Florida, found themselves faced with a production problem regarding the cylindrical shell which contains the lights. The question was; what would be the most efficient and economical way to produce this shell that measures 6" in length and is 4½" in diameter at the ends? Should it be formed from a metal strip and brazed? Could tube be used and bulged in a die? Or, should some other method be employed?

Revere, working with the design engineers of the Balford Corporation, exchanged ideas, weighed the pros and cons of various methods; experimented. They found that by using 70/30 Revere Brass Tube in a light anneal temper, it would take the bulging in the die satisfactorily and at the same time show up well as far as grain size control was concerned. By this method, complicated and costly forming operations and brazing could be eliminated, production speeded and the shell formed without any unsightly seam. Also, no extra hand finishing would be necessary before plating.

Perhaps one of the many types of Revere Brass or one of the other Revere Metals or Alloys can help you improve *your* product —cut your production costs. Why not tell Revere's Technical Advisory Service about *your* metal problems? Call the Revere Sales Office nearest you today.



UPPER LEFT shows brass shell of the Rev-O-Lite as it comes from the bulging die. Without any extra finishing, which would have been necessary had shell been made of strip and brazed, shell is chrome plated as shown at lower left. At right is the completed assembly of the Rev-O-Lite ready for action on the roofs of all kinds of emergency vehicles such as police patrol cars, ambulances, fire trucks, etc. Chrome finish base is of cast zinc alloy.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, New York

• • •

Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; New Bedford, Mass.; Los Angeles and Riverside, Calif.; Rome, N. Y. — Sales Offices in Principal Cities, Distributors Everywhere.

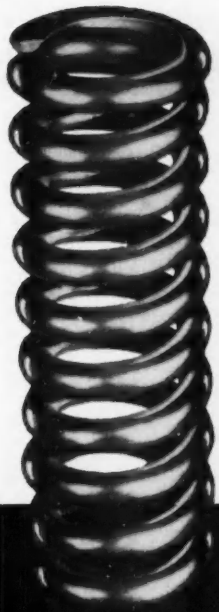
all changes are acted upon immediately. Change control maintains a close liaison with both engineering and manufacturing and is able to establish best effective points for changes and methods of accomplishing them. Quick Fix is a potent trouble-shooter for this department. With the change control department administratively separated from engineering, manufacturing, and sales, it can work in close liaison with these departments and still act without prejudice to accomplish successfully all changes from their very inception.

The Installation Line

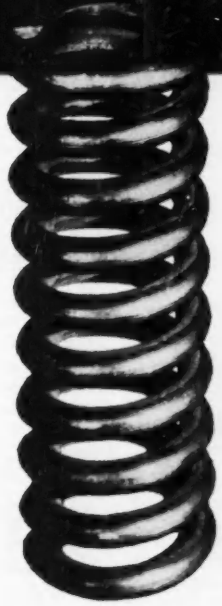
Assembly and installation work, especially installation work at Douglas El Segundo, presents a very complex problem, viewed as a whole. Airplanes with four different types of power—jet, rocket, turbo-prop, and conventional propeller—are being worked on at present. In addition, our model in the highest rate of production, the AD, has some 22 versions for various purposes ranging from attack dive bomber, night attack, radar counter-measures, airborne early warning, and anti-submarine, to target towing utility types. All of these versions move on the same installation line and are worked upon by the same personnel. What would normally be a mammoth training problem with expensive learning periods has been eliminated simply by giving the workman quite detailed instructions. He is concerned only with doing first things first—each step that he must take is numbered and explained in a detailed instruction sheet. He must follow proper numbered sequence from 1 to, say, 10, and a complicated job will be finished through doing a number of simple jobs in the correct order. We feel that the extra cost of furnishing the shop with the most complete paper work possible pays for itself many times, even on a line containing a single version of a model. The advantages of the detailed instructions in quickly making large numbers of new personnel useful in a mobilization program are obvious.

In the assembly and installation work some supervisory costs are saved and better coordination is achieved by having each assembly department be responsible for the entire airplane while it is passing through its area. That is, the installation line as such has no supervisor, who would have to deal with each of the assembly department supervisors; instead, each assembly and installation supervisor deals only with the one or two department heads adjacent to him.

By adhering to the theories as expressed in some of the methods briefly outlined here we have been able to operate economically while meeting strict, quality Navy specifications for increasingly complex aircraft. There is every reason to believe we can continue to do so no matter what the requirements may be for defense airplanes in the years to come.



How much should a spring cost?



● It all depends on the job it has to do. Because *overdesign* is just as bad as *underdesign*. You lose both ways—the end product either performs poorly, or it costs too much.

When costs are important, and they usually are, we don't believe in designing springs with unnecessary, elaborate and costly performance characteristics. We don't recommend stainless or high alloy steels if carbon steel will do the job. And we're quick to suggest ways to simplify springs—and cut their cost. You can be sure that, whenever it's possible, our designs will utilize the lowest cost material and fabrication methods that will do a good job for you.

Let our engineering staff—our comprehensive production and testing facilities go to work for you. You'll get a better spring—at a price—that will fit your needs *exactly*.

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA STEEL COMPANY, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM, SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

AMERICAN QUALITY SPRINGS

UNITED STATES STEEL

For additional information regarding any of these items, please use coupon on page 54

(*Continued from page* 52)

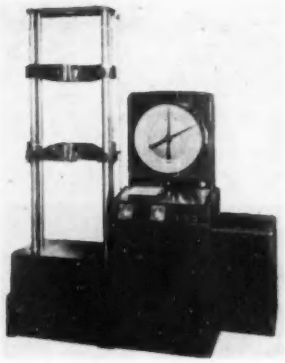
coarse adjustment and permits quick interchange of objectives, retaining focus.

In the improved filter and heat absorbing system having swingout type filter holders, a new heat-absorbing glass replaces the inconvenient and messy water cell. A solid cast optical bed provides sturdy support for the camera, microscope and light source. Built-in shock absorbers, combined with solid construction, provide increased image stability.

The Balphot Metallograph includes equipment for bright field, dark field and polarized light. Metallographic phase contrast accessories can be accommodated.

Booth 2025

MS-21—Screw Power Testing Machine



Featured in the booth of American Machine and Metals, Inc., of East Moline, Ill., is the company's new 30,000 lb capacity universal screw power testing machine with electronic control affording constant crosshead travel. A Pendomatic indicating unit eliminates loose balancing weights and wrong combinations. Five scale ranges are secured by the turn of a knob. From 0 to full capacity is afforded with a single revolution of the pointer. An accuracy of ½ of one per cent of indicated load is claimed

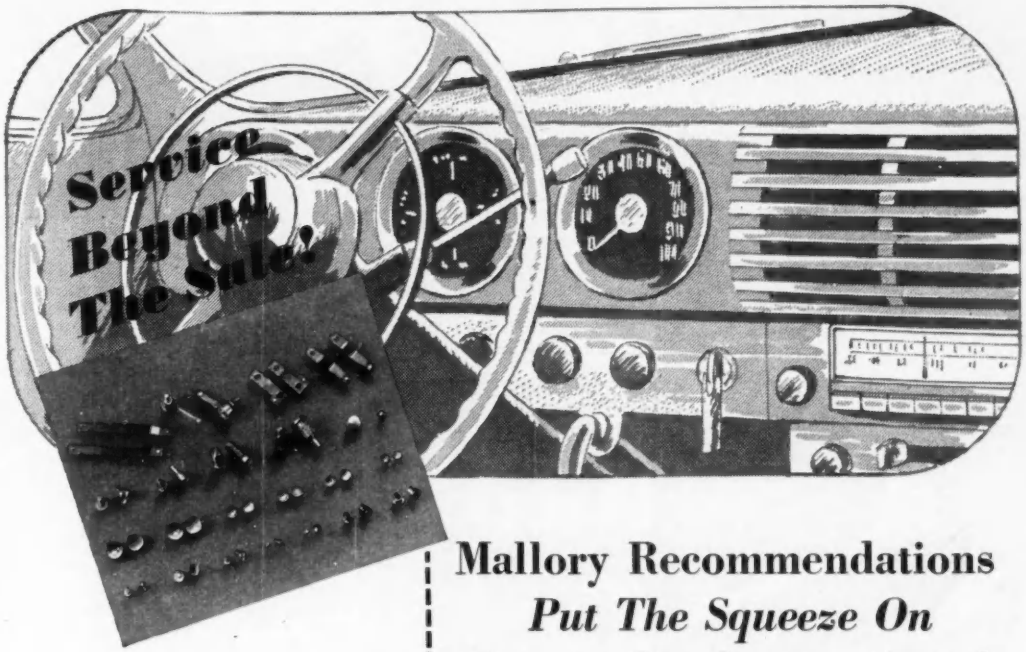
Booth 901

MS-22—Plastic Patterns; Hard-Surfacing Machine

A new hard-surfacing machine and plastic patterns for investment castings will be displayed at the Metal Show by Haynes Stellite Div. of Union Carbide and Carbon Corp., New York, N. Y. A live demonstration featuring mechanized hard-facing by the oxy-acetylene process will show the advantages over hard-facing by the usual hand torch methods. Claimed faster, the deposits produced are smoother and more uniform, hard-faced parts can be made to conform more closely to specified requirements, and less hard facing rod is required per piece surfaced.

Plastic patterns, a new development in the production of precision-investment castings will also be displayed. The use of plastic patterns is said to help to keep down the cost of parts produced by the investment casting process and to permit closer tolerances to be held.

(*Turn to page* 114, *please*)



MALLORY SILVER AND TUNGSTEN CONTACTS

Tungsten is used in contacts for electrical equipment where resistance to electrical arcing and wear are important. Silver and silver alloys are used where low resistance is important. Mallory has developed contact metals from many alloys to meet every contact requirement. Among the many Mallory contact alloys are the Elkonites* and Elkonium* alloys. Mallory will gladly work with you to find the right contacts to meet your specifications. Write today.

Mallory Recommendations *Put The Squeeze On Contact Production Costs!*

Everyone is striving for ways and means to beat the break-even point . . . and Mallory's contribution, in contact costs alone, is helping to ease many tight situations.

Typical is the case of an automotive electrical equipment manufacturer who was emphasizing cost reduction. Mallory dug into the customer's contact production program and came up with specific recommendations. Design, material and final assembly improvements were made possible by new Mallory alloys and production techniques. Every last penny was squeezed out of contact costs with a resultant $75,000 yearly saving to the customer.

That's service beyond the sale!

Mallory contact know-how is at your disposal. What Mallory has done for others can be done for you!

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Capacitors	Contacts
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Resistance Welding Materials

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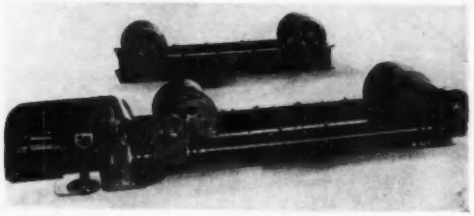


(Continued from page 112)

Booth 506

MS-23—Turning Rolls

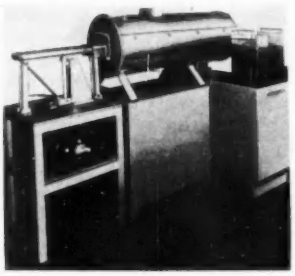
Worthington Pump and Machinery Corp., Harrison, N. J., will exhibit these new Model 75 turning rolls which have a turning capacity of 75 tons. Rolls feature anti-friction bearings, rubber-tired rollers, chain type couplings, and steplessly adjustable variable speed drive. They are part of a complete line of positioning equipment for use in the welding and assembly of large awkward-to-manage equipment

Booth 1931

MS-24—Shaker Hearth Continuous Furnace

The shaker hearth continuous furnace, displayed by Hevi Duty Electric Co., is a production machine which was designed for bright hardening, bright carburizing, bright dry cyaniding and similar heat treating operations which require temperatures to 1900 F. A wide variety of parts, including stainless steel, may be processed. Small screws, springs, needles, stampings and watch parts, as well as larger pieces, have been successfully heat treated in production operations.

The shaker hearth furnace is of the horizontal split tube type and can be opened to provide access to the heating chamber. The furnace insulation is designed to minimize heat loss, and the heating elements used provide uniform controllable heat. An alloy hearth plate extends into the alloy retort to a point directly over the quench chute. By periodic forward motions and abrupt stopping of the hearth plate, the work is moved through the heating chamber to the quench chute. A variable speed drive controls the rate of travel. Suitable connections are provided for the introduction of a prepared atmosphere. A heat resistant glass window is built into the rear wall of the retort so that the progress of the work along the hearth plate can be observed.



Hevi Duty shaker hearth continuous furnace

(Turn to page 116, please)

Trying out automobile quarter panel die at Superior Tool and Die Co. 21535 Hoover Rd., Detroit 13, Mich.

HERE'S WHERE A PRESS HAS TO BE PERFECT

-- SO IT'S A CLEARING

No more exacting conditions can be imagined than those under which this 1300-ton double action Clearing press has to perform day after day. It is owned by the Superior Tool and Die Company of Detroit, and it is used for test runs of new dies before they are accepted by customers. Every stamping is therefore examined far more critically than would be the case in commercial production. The slightest lack of precision in the press would make it impossible to check the dies properly.

Superior Tool and Die Company chose a Clearing press for this work because they could not afford to compromise with quality. Their customers expect dies to perform without excuses, and the evidence of acceptable stampings is the only evidence that counts. The Clearing press produces that evidence from Superior's carefully made dies.

If you want press equipment that saves time, speeds production, and assures quality output, you can profit from the example of men who "know their stuff" in metalworking.

CLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION

CLEARING MACHINE CORPORATION

6499 WEST 65TH STREET • CHICAGO 38, ILLINOIS

WHAT'S NEW at the National Metal Show

For additional information please use coupon on page 54

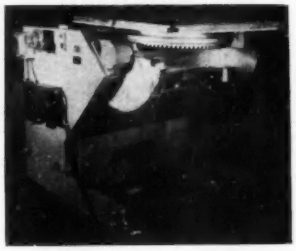
(*Continued from page* 114)

Booth 2427

MS-25—Positioners; Turning Rolls

Two new items shown by the Aronson Machine Co., Arcade, N. Y., consist of heavy duty gear driven positioners, and TracTred turning rolls.

The heavy duty gear driven positioners are designed so that the work table is powered as well as the tilt. The work piece is in complete balance at all times and can be positioned by merely pushing by hand. The machines embody all features for the precision work of automatic welding, including machined, fabricated sector and bull gears for rotation and tilt, infinitely variable speed rotation of the work table, and mercury ground on the work table axis



Aronson heavy duty gear driven work positioner

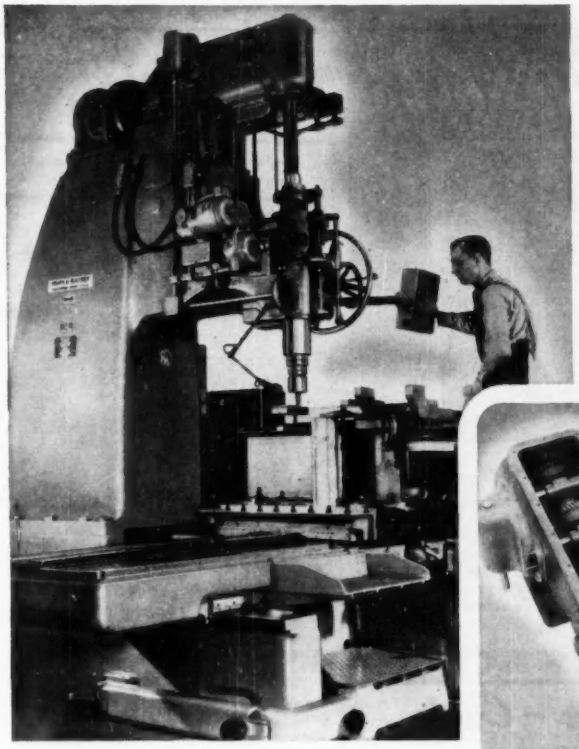
with a ground cable from the frame of the machine to the main journal of the work table.

The TracTred turning roll permits light gage tanks as well as heavy walled tanks to be rotated without employment of stiffener rings, etc., for preventing the walls of the tank from collapsing during rotation. Rotation is accomplished with rubber tired shoes under the entire bottom surface of the tank.

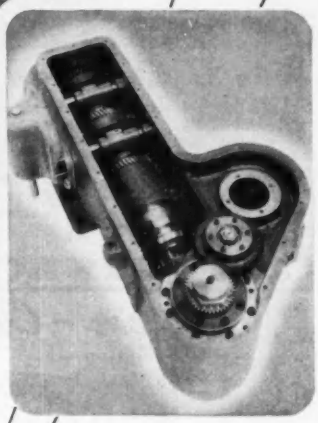
Booth 722

MS-26—Hard Steel Drill

Black Drill Co., Cleveland, Ohio, announces a new and improved Hardsteel drill for the drilling of hardened and work-hardening steels. Improvement results from a change in the formulation of the alloy material itself. The new drill has improved tortional strength



15 TONS OF *Accuracy!*



Pratt & Whitney Model 4E Jig Borer.

Inset: View of Twin Disc MTU Duplex Clutch in the gearhead.

. . . with a Twin Disc Clutch

It takes real *precision* to locate and bore holes with an accuracy of *.0002"*. But Pratt & Whitney's new Model 4E Jig Borer does it. A 15-ton example of accuracy, stability and fine workmanship, this machine utilizes a 4½" Twin Disc MTU Duplex Clutch and brake combination in the gearhead.

Built to "wear like a bearing and perform like the best friction clutch" . . . that's the standard to which Twin Disc machine tool clutches are held. In addition to compactness, high torque capacity and long wear-life, Twin Disc Clutches feature ease of operation and single point adjustment. No wonder precision manufacturers like Pratt & Whitney think of Twin Disc when their design calls for *accuracy*.

For more information on Twin Disc Machine Tool Clutches see your nearest Twin Disc dealer or write for Bulletin No. 134-A.

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES

Clutches & Hydraulic Drives

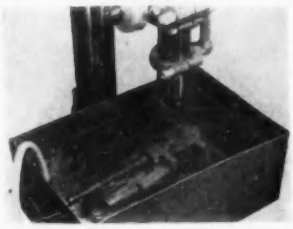
TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

BRANCHES: CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEWARK • NEW ORLEANS • SEATTLE • TULSA

WHAT'S NEW AT THE National Metal Show

For additional information please use coupon on page 54

which permits wider latitude in drilling pressures—also increased toughness of the metal with retention of all the original wear-resisting properties. It can be



Black Hardsteel drill being used submerged in water

used for drilling parts completely submerged in water, or with a full flow of coolant, as well as for dry drilling with proper care being taken to avoid overheating.

Booth 402

MS-27—Extension Spindles for Drilling

Extension spindles for the Multi-Drill, to be displayed for the first time by the Commander Mfg. Co., Chicago, Ill., increase the maximum drilling area from a 9 in. to a 22½ in. bolt circle. The new extension spindles are interchangeable with standard spindles, and effective for use on hole patterns carrying large areas. Illustration shows Model 900 Multi-Drill so equipped

(*Turn to page* 121, *please*)

If . . . you bought your car in pieces . . .

. . . you'd understand even more why discriminating automotive manufacturers are so particular about each individually formed metal part . . . such as radiator grilles, instrument panels, window ventilators, and other interior and exterior trim. And it wouldn't take long to see why, for years, many manufacturers have called on MOTOR PRODUCTS to furnish them with quality parts which are functional, as well as eye-appealing.

MOTOR PRODUCTS CORPORATION

11801 Mack Avenue • Detroit 14, Michigan

The **CRANKSHAFT** is the backbone of the internal combustion engine.

Modern trends—more r.p.m.'s, higher compression ratios, more power per cubic inch of displacement—all lend additional emphasis to the importance of crankshaft quality.

WYMAN-GORDON experience, the most extensive in the industry, assures the maximum in physical properties, uniform machinability, and balance control.

Standard of the Industry for More Than Sixty Years

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Forgings of Aluminum, Magnesium, Steel

WORCESTER, MASSACHUSETTS, U. S. A.

HARVEY, ILLINOIS - - - DETROIT, MICHIGAN

WHAT'S NEW AT THE National Metal Show

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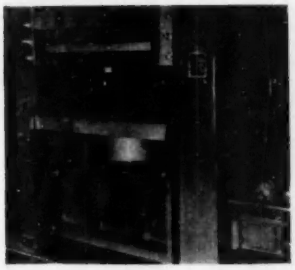
(*Continued from page* 118)

Booth 122

MS-28—Hydraulic Booster For Press



Close-up shows a hydraulic bolster manufactured by the Verson Allsteel Press Co., Chicago, Ill., mounted on the bed of a 350 ton single crank press. The hydraulic pumping unit, oil pot, relief valve and pressure gage comprise a compact assembly mounted on the right hand column of the press. The unit maintains a constant preset oil pressure in the bolster. In effect, this bolster is a hydraulic overload cushion mounted on top of the press bed. It can be set at any desired tonnage, but is normally set 10 to 15 per cent over the tonnage required by the work being performed, so that there is no deflection or cushioning effect at the working tonnage. If, for any reason, the set tonnage is exceeded, the relief valve operates to depress the bolster, allowing the ram of the press to complete its stroke without damage to press or dies. This bolster is well adapted for coining, embossing, or bottoming operations, where there is danger of accidental overloading of the press, the company points out

(*Turn to page* 132, *please*)

Other New SHOW Products

Other New Products at the show which appeared in recent issues of AUTOMOTIVE INDUSTRIES are listed as follows:

Company	Issue	Booth
Standard Electrical Tool Co. Carbide tool grinder, twin-wheel, wet or dry, page 51	4-1-50	2102
Commander Mfg. Co. Drill Chip Breaker, page 54	6-15-50	402
Multi-Drill, page 50	4-1-50	
Tapper Head, page 50	4-1-50	
Cleveland Industrial Tool Corp. Citco Hydraulic Diamond Turner, Model 1002-A, page 67	2-15-50	2421
Magnaflux Corp. Magnaflux portable unit KH-05, page 54	8-15-50	1924

When you specify Carboloy Tools you get Maximum Productivity!

The uniform high quality, consistent performance and long life of Carboloy Tools assure you of

- ★ Maximum production per machine
- ★ Maximum machine speeds
- ★ Maximum adherence to tolerances
- ★ Maximum tool life
- ★ Maximum pieces per tool
- ★ Minimum number of rejects

. . . advantages that add up to maximum productivity — plant wide.

CARBOLOY®

CEMENTED CARBIDE

STANDARD TOOLS

OF YOUR MACHINING

with this team of 11 styles of low-cost Standard Carboloy Tools

THAT'S right! This versatile team eliminates the need for a large, costly inventory of special tools.

These 11 low-cost styles are adaptable for up to 80% of your single-point tool machining operations. For special applications, these tools can be quickly, economically ground in your own tool room to meet your specifications.

Here are three other big reasons for choosing Carboloy:

Universal Use—can be used in lathes, boring mills, etc., to machine any metal or nonmetal; for hundreds of single-point tool machining operations. Suitable for job lots or quantity production.

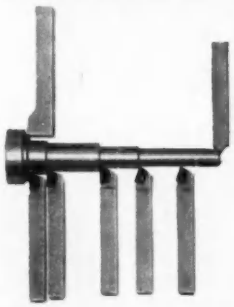
Low Cost—versatile Standard Carboloy Tools are comparable in price to many high-speed steel tools, and in many sizes are actually cheaper. Mass-produced under rigid quality controls to give you the highest quality at low investment cost.

Greater Availability—Authorized Carboloy Distributors in 93 cities, coast-to-coast, carry stocks of Standard Carboloy Tools. In most areas off-the-shelf delivery of most styles and sizes normally can be made.

And you can add the advantages of simplified ordering, easy selection and versatile grades, plus the extra assurance that in the Carboloy brand of tools you get uniform quality in *every* tool . . . in *every* order . . . in *every* regrind.

CARBOLOY COMPANY, INC.
11151 E. 8 MILE AVE., DETROIT 32, MICHIGAN

HERE'S ADAPTABILITY . . .

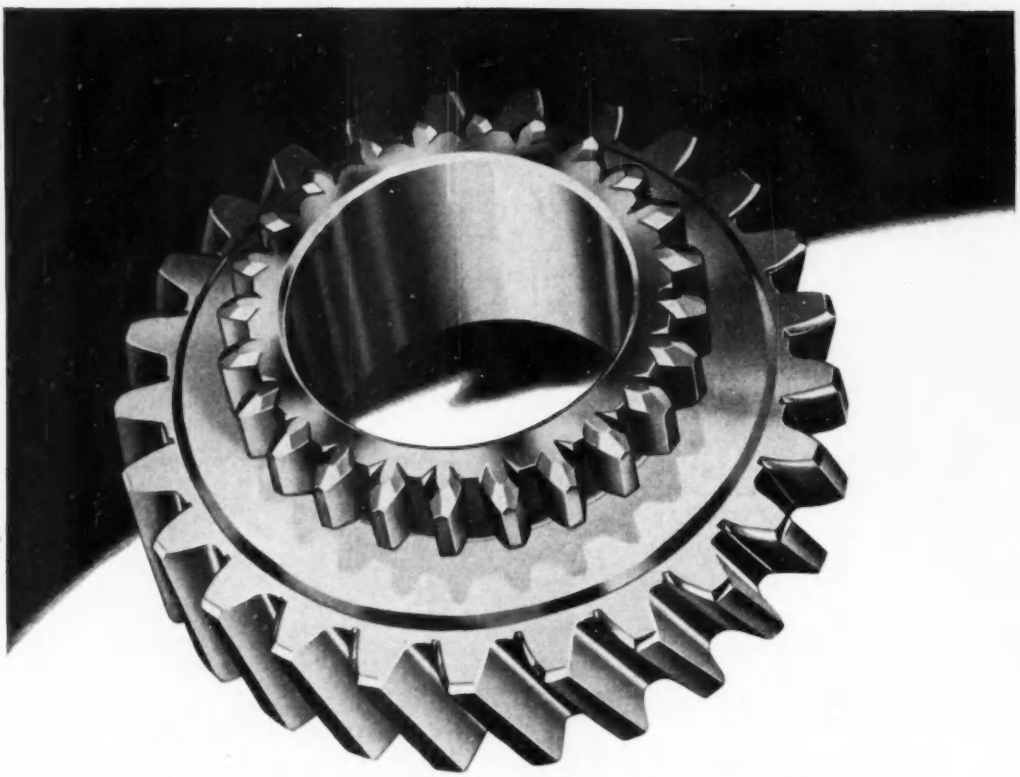


Here's how 4 styles of low-cost STANDARDS do the work of 7 specials

A tool problem on a rush order was solved by quickly adapting these 4 styles of low-cost Standard Carboloy Tools to do the work of 7 specials. Proof that it pays to standardize with Carboloy Standards!

"The least number of tools for the greatest number of jobs"

IT PAYS TO STANDARDIZE WITH
STANDARD
CARBOLOY TOOLS
13,000,000
USED BY INDUSTRY



Get Increased Gear Production with High-Quality Alloy Steels

The extreme precautions that Bethlehem takes in manufacturing gear steels pay off handsomely with increased production in our customers' plants.

These steels are as clean, and as uniform in analysis as modern methods can make them. Surface flaws, internal voids, and non-metallic inclusions are held to the minimum, while chemical compositions and grain size are rigidly controlled.

Freedom from voids or surface flaws reduces the possibility of the steel splitting or opening up during forging.

The absence of inclusions adds greatly to the life of cutting tools and increases the percentage of acceptable pieces machined per tool.

Controlled analysis and grain size insure uniform response to heat-treatment and minimize distortion that would be cause for rejection.

Bethlehem manufactures both carburizing and oil-hardening types of gear steels. Full information on these or any of the AISI grades is readily available.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM ALLOY STEELS

REPORT ON A **GREENLEE** ACHIEVEMENT

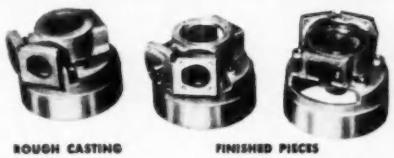
4 YEARS AND 2,000,000 PIECES LATER...

In 1946, the 24-station Greenlee Automatic Transfer Processing Machine shown here was delivered to the Nash-Kelvinator Corporation and went to work machining refrigerator compressor bodies. Thousands of people, including many tooling and production men, have visited the Nash-Kelvinator plant to see this huge machine in operation, since it represents one of the most advanced examples of high-performance, fully-automatic, mass-production equipment. Much of the success of this machine has been due to the excellent maintenance which Nash-Kelvinator has given it in order to insure consistent accuracy and the high quality of work demanded.

PRODUCTION. Original specifications called for production of 188 pieces per hour at 80% efficiency. Actual production records over a period of six months ending in February 1950 show an average of 212 pieces per hour. Total production since installation is approximately 2,000,000 pieces.

MACHINE CHANGES. In 1947 and again in 1949, several heads on the machine were altered in both position and tooling to accommodate design changes in the compressor bodies. No serious production loss was involved in making these alterations. This illustrates the flexibility of Greenlee design.

SCRAP. Not over one or two pieces a week are scrapped for reasons attributed to the operations on the Greenlee, according to Nash-Kelvinator officials . . . a commendable record considering the number of pieces processed.



ROUGH CASTING FINISHED PIECES

THE PIECE machined on the equipment shown above is a cast iron compressor body for residence type refrigerators. The work goes through the machine on special fixtures carrying two pieces each. A total of 152 operations are performed, using 50 drills, 12 face mills, 2 side mills, 2 end mills, 12 boring tools, 38 chamfering tools, and 36 taps.

PRODUCTION MACHINERY

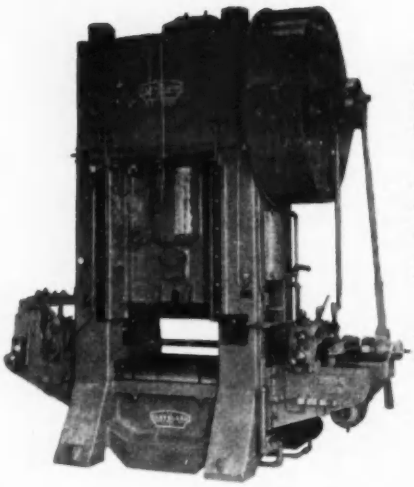
GREENLEE

GREENLEE BROS. & CO.

1760 Mason Ave., Rockford, Illinois

MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

"Step-up" production—cut manufacturing costs with CLEVELAND PRESSES



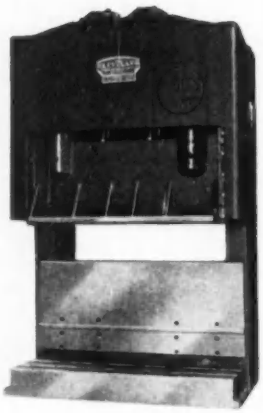
EVERY manufacturer of sheet metal products interested in stepping up production and reducing manufacturing costs will find it advantageous, as many other leading manufacturers have, to install Modern Cleveland Presses designed for speed, accuracy and economy of operation.

The many improvements included in the advanced engineering of Cleveland Presses have not been confined to any one type or size of Cleveland. Every new Cleveland offers *longer die life, increased accuracy* and *minimum maintenance.* The valuable knowledge gained in over 60 years, as builders of precision metal working tools, has enabled us to include vital improvements in each of the eleven types of Cleveland Presses.

Therefore, if you are considering replacing any of your present Press equipment, or installing additional Presses, it will pay you to get the complete specifications covering suitable Cleveland Presses. A-5413

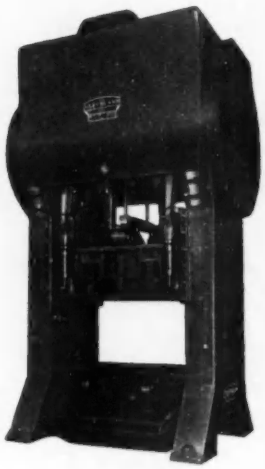
SINGLE POINT STRAIGHT SIDED PRESS EQUIPPED WITH DOUBLE RACK AND PINION ROLL FEED

Stroke	3″
Adjustment	6″
Shut Height	28″
Face of Slide	34″ x 40″
Area of Bed	42″ x 48″
RPM	45″
Capacity	600 tons



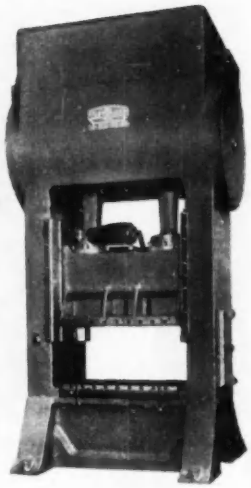
TWO POINT OPEN BACK GAP PRESS

Stroke	12″
Adjustment	8″
Shut Height	54″
Face of Slide	30″ x 84″
Area of Bed	32″ x 100″
RPM	30
Capacity	125 tons



TWO POINT DOUBLE ACTION TOGGLE PRESS

	SLIDE	BLANKHOLDER
Stroke	23″	15″
Adjustment	5″	5″
Shut Height	37″	35″
Face of Slide	34″ x 56″	45″ x 66″
Area of Bed	45″ x 72″	
Capacity	200 tons	120 tons



TWO POINT STRAIGHT SIDED PRESS

Stroke	12″
Adjustment	8″
Shut Height	36″
Face of Slide	48″ x 60″
Area of Bed	48″ x 60″
RPM	30
Capacity	300 tons

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THE CLEVELAND PUNCH & SHEAR WORKS CO.
U.S.A.
Established 1880
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FABRICATING TOOLS

CLEVELAND 14, OHIO

How careful design solves difficult sealing problems

Equipment designers who give advance consideration to bearing protection find it pays off in more dependable performance. A good example is the new rocker-arm type shovel which is bringing new economy and efficiency to the costly job of moving earth, heavy ores and other materials. Since the equipment operates in tough abrasive conditions, bearing protection was a major design problem.

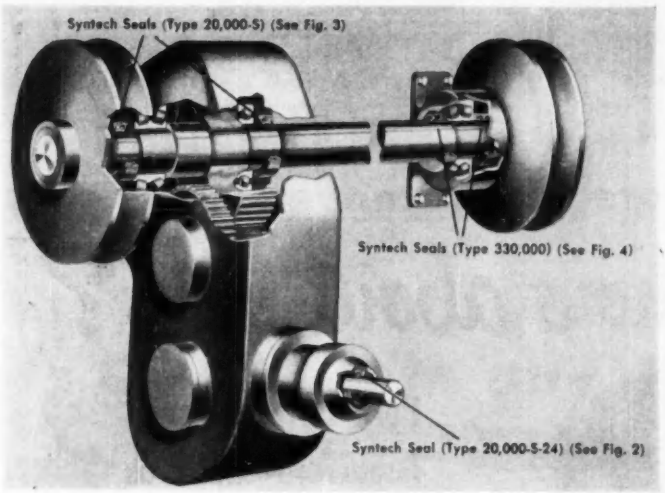

FIGURE 1 — Typical transmission from rocker-arm type shovel

A variety of sealing problems encountered

The power transmission (Fig. 1) operates intermittently clockwise and counter clockwise at four cycles per minute. Speeds vary from a maximum of 1500 r.p.m. at the power intake to 60 r.p.m. at the main shaft. Three distinct conditions are presented: flooded lubrication at the power intake, splash lubrication at main bearings and grease pack in the pillow block. Thus three sealing problems are encountered all of which are affected by the reciprocating action of the mechanism. Furthermore, since five seals are required, power absorption is a factor.

Three types National Syntech* oil seals are utilized

The inherent characteristics of National Syntech Seals make them ideal for this application. They are designed for minimum shaft contact, hence create very low drag. At the same time, they are capable of "zero-leakage" under flooded conditions. A spring-tensioned Syntech seal with a leather auxiliary member mounted in opposed position (Type 20,000-S-24) (Fig. 2) is used for the power intake shaft, where extraneous *dust* conditions exist. Two dual-lip Syntech Seals (Type 20,000-S) (Fig. 3) are employed at the upper main bearings where heavy abrasive materials must be withheld and a light lubricant retained.

FIGURE 2

At the pillow block, which is subjected to the heaviest abrasive exposure, an unusual expedient was adopted. Two dual-lip Syntech Seals (Type 330,000) (Fig. 4) with lips mounted in tandem are installed with the lips facing *outward*. This installation provides maximum protection from heavy extraneous abrasives and permits cleaning the bearings and seals by forcing heavy grease through from the inside with a grease gun during regular lubricating periods.

FIGURE 3

FIGURE 4

National Oil Seal engineers' experience with every conceivable kind of oil or fluid retention problem is yours for the asking. The chances are good that the seal you need has already been developed, in which case you'll save much in tooling costs. However, if special designs are necessary we are ready to help you.

"Let Your Decision be Based on Precision"

NATIONAL OIL AND FLUID SEALS

NATIONAL MOTOR BEARING CO., INC.

General Offices: Redwood City, California
Plants: Redwood City, Calif.; Downey (Los Angeles County), Calif.; Van Wert, Ohio

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DETROIT, MICH.	*Room 1026 Fisher Building, Trinity 1-6363*	WEST SPRINGFIELD, MASS.	*1025 Elm Street, Springfield 2-1881*
DOWNEY (Los Angeles Co.), CALIF.	*11634 Patten Rd., Tepas 2-8166*	EAST SYRACUSE, N. Y.	*226 Roby Avenue, East Syracuse 366*
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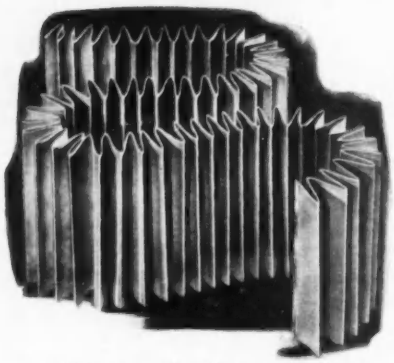
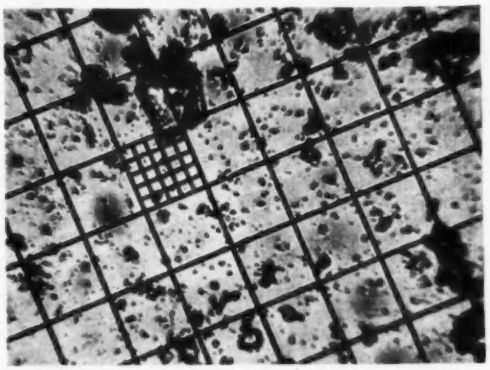
More filtering surface . . . better filtering surface



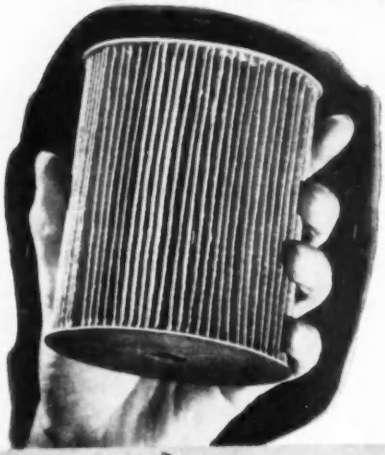
Up to 10 times greater filtering area. Revolutionary accordion-pleated design. More than 10 ft. of filtering area in 3½ ins. diameter.



Filters Microscopic Particles. In tests made with approved graded Test Dust ranging up from one micron (.000039 in.) up, Purolator* removed 97.8% in first pass through.

. . . assure more dirt removed

But how about this?



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"FIRST IN THE FIELD OF FILTERING"

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When the additives in motor oil stay *in*, you get the protection you pay for—*protection of alloy engine parts from acid action.*

When filters take out the additives you lose two ways; you pay for something you don't get; your engine suffers needless wear-and-tear —with costly repairs the end-result.

You are invited to consult with our engineering department at any time on specific questions concerning oil filters. Or write for available data on the Purolator Micronic* Oil Filter.

*Reg. U. S. Pat. Off.

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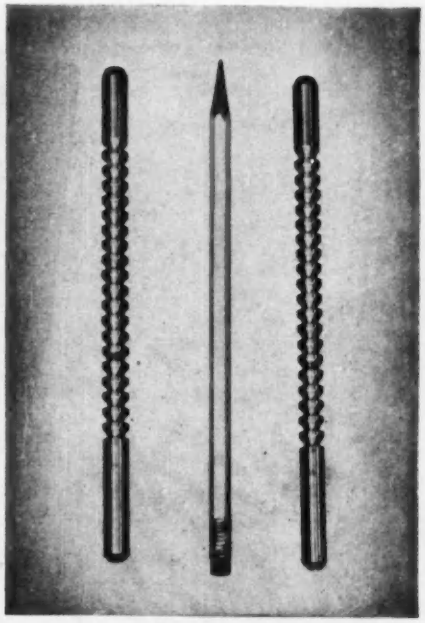
Perhaps your job calls for a big, husky, man-sized broach like this 76" involute spline broach, built for a leading gear manufacturer.



. . . or maybe you use small broaches . . . like these, for broaching automotive ignition parts.

precision QUALITY in any QUANTITY with American ENGINEERED Broaches

Write today for your copy of Catalog No. 450, 32 pages packed with useful, practical broaching information.

Big. Small. Short. Tall. Two, 200 or 2,000 at a time. When American builds broaches, you can count on this:—A standard of precision that will consistently give you top economy in production . . . a quality that delivers a maximum number of parts between resharpenings . . . and a maximum number of resharpenings for longer broach service life. You can expect these advantages with American-engineered broaches. You get them because American gives you more than twenty-five years' experience with broaches, fixtures and machines . . . twenty-five years of close cooperation with manufacturers. Knowing all three, they can engineer to get the most, production-wise, from all three. Why not present your next broaching problem to American for a profitable solution? Send part print or sample and hourly requirements for their obligation-free recommendations. Address Dept. 1.

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A DIVISION OF SUNDSTRAND MACHINE TOOL CO.

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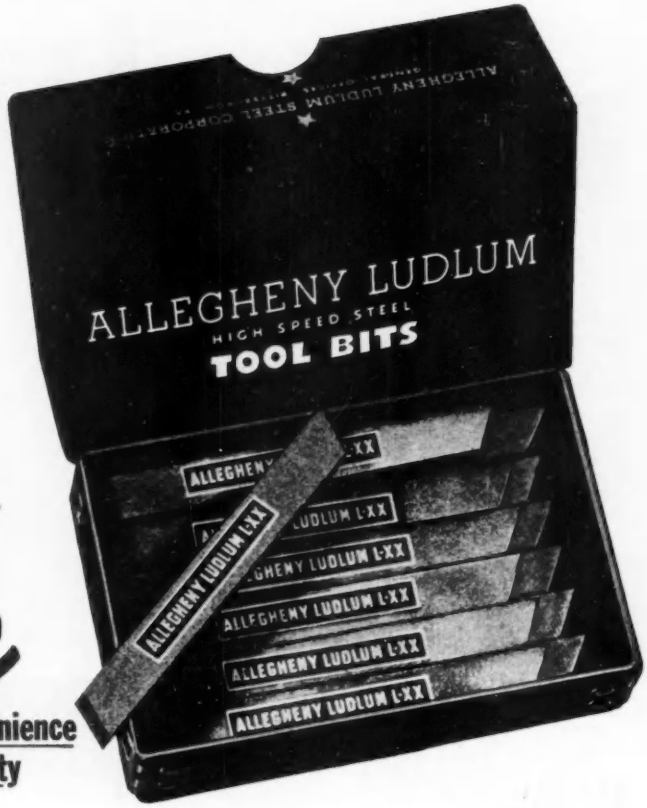
See American First — for the Best in Broaching Tools, Broaching Machines, Special Machinery

SUNDSTRAND MACHINE TOOL CO. S ROCKFORD ILLINOIS U.S.A.



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Pocket Price List NOW READY!

Just send a postal-card request—giving name, position, company, and address. Ask for "A-L Tool Bit Price List," pocket edition. While you're writing, also include the illustrated four-page folder, "A-L Mill Treated High Speed Steel Tool Holder Bits." Yours for the asking.

Write Today

ADDRESS DEPT. AI-9

• These better tool bits, packed in the famous blue-and-gold boxes, are immediately available in standard sizes from stocks located at 28 convenient points throughout the country.

Ready Made—this means that bits are: (1) already cut to correct lengths, with clearance bevel at both ends; (2) already heat treated uniformly by mill experts; (3) furnished with either regular finish or ground finish; (4) inspected individually for hardness, size, and surface. "Finish-ground" bits are extremely accurate in dimension, entirely free from decarburization and scale, and ready for instant use upon grinding the cutting point to desired shape.

With six popular grades to choose from, you can cover a wide range of cutting needs by specifying these tool bits. Our informational service will be useful to you in selecting grades. Call A-L, or an A-L distributor.

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Pittsburgh, Pa.

TOOL STEEL DIVISION: DUNKIRK, N. Y.

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Centrifugal found the way...

. . . to cheat the scrap piles (at both ends)

Quality is a claim most manufacturers make but few can prove it as consistently and as effectively as Centrifugal. And anywhere along the line from beginning to end. When you receive Centralloy sleeves and piston ring pots, your scrap loss day in and day out should **average** less than 3% (and as low as 1.5%) according to figures we receive from manufacturers we supply. Match these figures against those of any others.

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CYLINDER SLEEVES AND PISTON RING POTS are centrifugally cast in permanent molds from electric alloys. Choice of ten different alloys enables you to select characteristics that are just right for your engine — be it marine, rail or land. Send today for specifications and/or sample castings.

CENTRIFUGAL FOUNDRY COMPANY

MUSKEGON, MICHIGAN

Centrifugally cast electric alloys — heat-treated by exclusive patented process for Super Duty

For additional information please use coupon on page 54

(Continued from page 121)

Booth 1201

MS-29—New Welding Process

A new welding process called "Hidensity," to be featured at the booth of the Lincoln Electric Co. of Cleveland, Ohio, employs welding current densities on 5/64 in. electrode wire which melt the electrode at speeds comparable to using 10,000 amps on a standard 5/16 in. diam coated hand electrode. Useable with any standard Lincoln Electric SAE 600 or SAE 900 welding generator, or on SAE 600 gasoline engine-driven generator, the new process uses either a 3/32 in. or a 5/64 in. diam electrode wire.

A Manual Lincolnweld ML-2 unit for using the "Hidensity" process is connected to any standard Lincoln SAE 600 or 900 amp welding generator. This unit provides all the features of an automatic head. It is completely self-contained and portable to the work independently of the welding generator. It can be used on all types of flat and near flat work.

Manual Lincolnweld ML-2 unit for use with the "Hidensity" hidden arc welding process

The "ML-2" unit consists of a control case, wire reel case, conductor cable and welding gun. A feed mechanism in the control case automatically feeds wire at a pre-set arc voltage from the reel through the conductor cable to the welding gun. It is fed through the gun to the work. The gun holds inorganic granular flux which is deposited around the high density arc, completely covering the arc and crater as the gun is moved over the joint being welded. The welding gun is moved either by hand or by attaching it to a mechanized carriage of the cutting torch type.

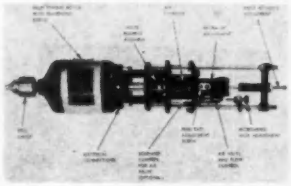
With the "ML-2" unit connected, a welding generator can be used for either "Hidensity" hidden arc welding or regular "open arc" hand welding; but not at the same time. The same welding machine can be used on a job for regular tack welding and finish welding with the "Hidensity" process.

Booth 722

MS-30—Self-Contained Drilling Units

Black Drill Co., Cleveland, Ohio, is introducing its new No. 1000 Models of automatic self-contained drilling units. All major parts are made of one-piece castings. The hydraulic check for controlling feed rate is mounted on the rear of the unit with two rigid side bars moving through oilless bushings to carry the rapid advance adjusting bolt.

In-line design has eliminated all lost motion and side slip. Pressure is exerted in a continuous straight line. The motor shaft, which is integral with the rotor, is the only rotating member. All adjustments for feed rate, length of stroke, depth control, and rapid advance are made, while units are operating, through three adjusting screws.



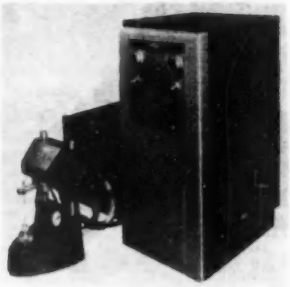
Black automatic drilling unit, Model 1000

Units may be operated in any position at any angle for single or multiple-setup work.

Booth 2548

MS-31—Bench Welding Equipment

Raytheon Mfg. Co. will display a new line of bench welding equipment which is said to weld many metals and combinations of metals. Units will include the Model G Weldpower head, Models 60, 225, and 1100 stored energy control units and the Model 5 KVA, ac control unit. The Model G head, in combination with control units 225 and 1100, will be in actual operation.



Raytheon Model G Weldpower head with Model 225 control unit

Booth 2823

MS-32—Slitting Shear

Slitting shear, SS series, introduced by the Beverly Shear Mfg. Co., Chicago, is made in 3 sizes to slit 14 gauge, 10 gauge and 3/16 in. mild steel. Upper and lower blades are adustable to compensate for wear and re-sharpening. High carbon high crome blades are available for cutting stainless steel

Booth 515

MS-33—Atmosphere Reducing Pellets

Tempil° Corp., New York, N. Y., will present for the first time at the Metal Show a line of Tempil° pellets for use in strongly reducing atmospheres at temperature levels where the standard pellets may be influenced by such gases as hydrogen, cracked ammonia and producer gas.

In addition to these special pellets for use in reducing atmospheres, new ratings of the standard series have been added to determine temperatures in the range from 2000 to 2500 F in 50-deg intervals. This supplements the hitherto available range (113 to 2000 F) in order to cover the growing uses of new materials for high temperature service.

Similarly, the range of Tempilaq°, liquid temperature indicator, has been extended to include the high temperatures. Tempilaq° will be offered for the first time from 1600 to 1950 F in 50-deg steps in addition to the previously available ratings in the 113 to 1600 F range.

4,000,000 reasons why M=TC

Morse is currently manufacturing timing chains at the rate of over 4,000,000 yearly . . . as original equipment for more than 70 per cent of all new passenger cars using timing chains.

Morse *means* Timing Chains to Automotive Engineers

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PRODUCTS OF BW BORG-WARNER

MORSE CHAIN COMPANY

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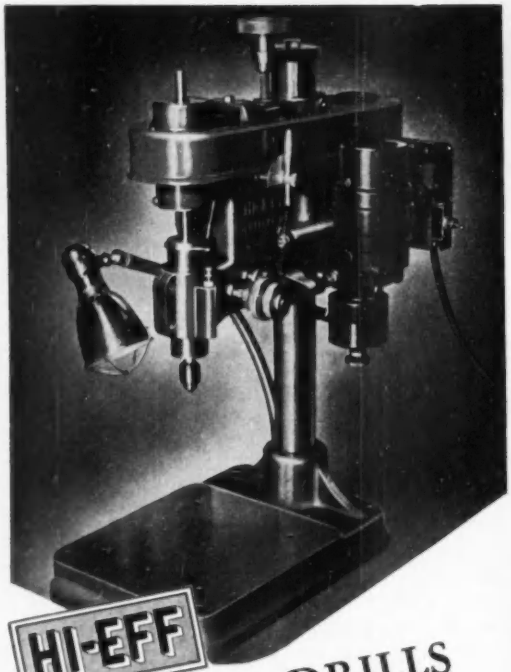

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Holes Down to .002" Diameter
Speeds Up to 40,000 R. P. M.

It requires HI-EFF precision to hold a fast running drill to close tolerances. With the combined run-out of spindle and chuck held within .0001", drill life is longer, scrap losses fewer. For positive lubrication and freedom from vibration, spindle and spindle pulley bearings run in a vapor-like cloud of oil. To provide the correct speed for each operation, standard models of the HI-EFF Series "A" Drills have a speed range of 800 to 10,000 R.P.M. in steps of 100 R.P.M. (Special models range up to 40,00 R.P.M.)

Designed and constructed for super-sensitive drilling, HI-EFF drills are performing efficiently and economically on production lines, in tool and instrument rooms. If you have a high precision drilling job, for hole sizes .002" to ⅛", write for details. (Also available are HI-EFF Series "B" Drills for holes .010" to ⅝".)

Taylor Dynamometer and Machine Company

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MANUFACTURERS OF "HI-EFF" Hydraulic Dynamometers
Static Balancing Machines—Sensitive Drilling Machines

NOW—
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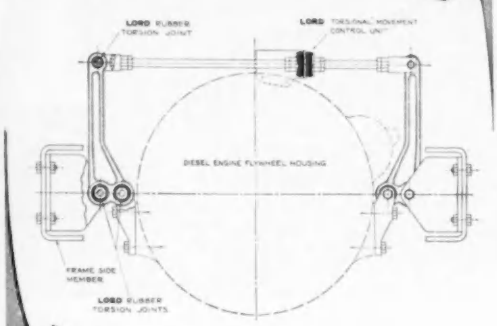

LORD DIESEL ENGINE MOUNTS

Here is an entirely new type of mounting system developed by LORD to meet the specific requirements of truck and bus manufacturers for smoother diesel engine performance. You need not accept our word for the quality of results. An engine manufacturer calls it "as smooth as a passenger car;" and a bus manufacturer describes it as "the smoothest Diesel installation in the country."

LORD Diesel Engine Mounts provide maximum torsional softness without excessive engine movement. Rubber bushings at all bearing points prevent transmission of noise . . . accommodate manufacturing tolerances of alignment . . . and eliminate need for lubrication. Vertical and horizontal natural frequencies are placed outside the range of road and frame frequencies. LORD Diesel Engine Mounts are easily adapted to existing frame and engine designs. Assembly cost is no higher than that of conventional types of engine mounting.

Engine, truck, and bus manufacturers are invited to write for a copy of Engineering Report No. 237 which describes the construction and operation of LORD Diesel Engine Mountings. Address your request to Product and Sales Engineering Department.

LORD MANUFACTURING COMPANY • ERIE, PA.
Canadian Representative Railway & Power Engineering Corp. Ltd.

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ENGINEERED *To Give* YOUR TRUCK 5000 TON-MILES *More* PAYLOAD

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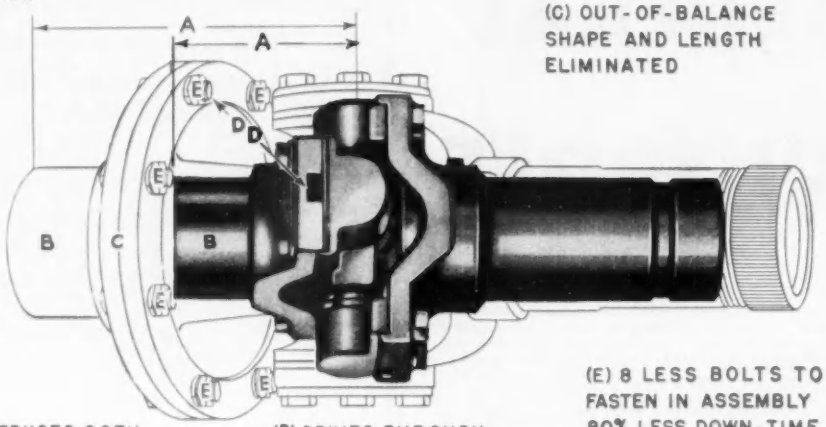

(B) REDUCES BOTH WEIGHT AND SIZE BY ELIMINATING THE FLANGE

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By reducing *deadweight* 28 pounds — through using MECHANICS 34% lighter UNIVERSAL JOINTS — a truck can increase its PAYLOAD over 5,000 ton-miles (during 400,000 miles of operation) *without extra cost*, or loss of capacity. The high-strength-to-weight ratio, 34% lighter MECHANICS Roller Bearing UNIVERSAL JOINTS Truck PROPELLER SHAFT places less load on the transmission and pinion bearings, and runs smoother. Let our engineers help add to the ton-mile PAYLOAD capacity of YOUR trucks, by specifying a weight-saving MECHANICS Roller Bearing UNIVERSAL JOINTS Truck PROPELLER SHAFT application.

MECHANICS UNIVERSAL JOINT DIVISION

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LOOSE, frozen, or failing threads can be easily and economically eliminated with Heli-Coil Inserts of precision-formed stainless steel or phosphor bronze wire. They prevent abrasion, corrosion and seizure ...they permanently protect threads against wear or stripping.

Heli-Coil Inserts are inexpensive . . . easy to install by hand or machine. They cut labor costs . . . make assembly and disassembly easier . . . eliminate complaints. They conform to all Federal Screw Thread and A.M.S. specifications for use on automotive and aircraft accessories and equipment.

Add a plus to your product, effect economies in salvage and service with Heli-Coil Inserts. Recommended for all threads in metals, plastics and wood.

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FREE Write to Oakite Products, Inc., 28A Thames St., New York 6, N. Y., for Folder F7642. This 8-page illustrated leaflet describes 19 advantages of the OAKITE CrysCoat PROCESS and lists 10 ways in which it cuts the cost of cleaning and preparing for painting.

Invitation When you attend the big METAL SHOW in Chicago, October 23 to 27, be sure to see the Oakite exhibit in Booth 322.

Drop in; ask about the OAKITE CrysCoat PROCESS; and get your copy of the 44-page illustrated booklet *"Some good things to know about Metal Cleaning."*

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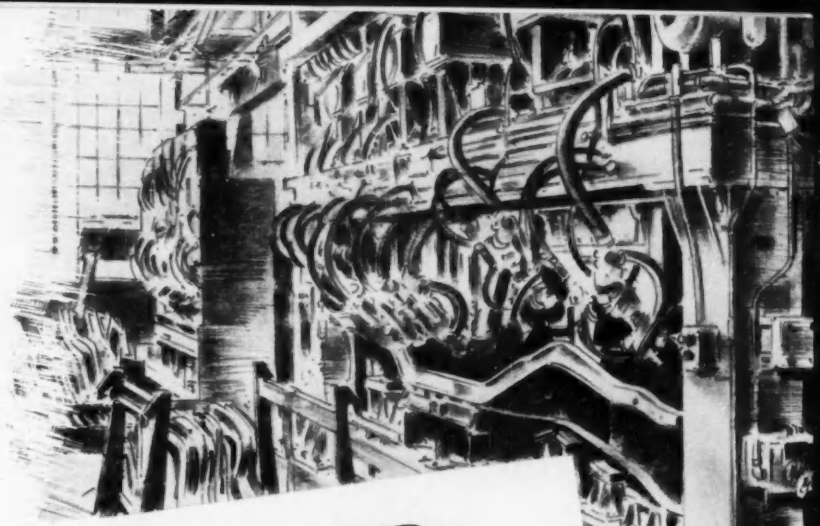
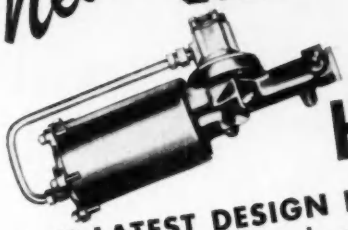
MIDLAND METHODS

Equipment like this remarkable quarter-million-dollar automatic electric welding machine typifies Midland methods of achieving production efficiently — at lowest cost.

Whatever the product of Midland's vast array, you may be sure that Midland facilities, engineering skill and experienced personnel will have worked together to give you outstanding value.



New! MIDLAND AIR HY-POWER



THE LATEST DESIGN IN AIR-OVER-HYDRAULIC

Supplied in truck and tractor air brake kits

Carefully Consider These 9 Points:

1. Governor is an integral part of compressor.
2. Does not disturb standard brake pedal installation.
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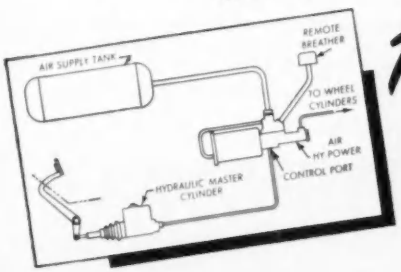
9. Does not disturb the original hydraulic brake operation in case of inadequate air pressure. Direct applied power. Completely sealed system. Long Life. Simplicity. Compact.

See your Midland distributor, or write to us for literature.



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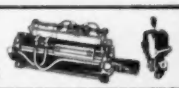
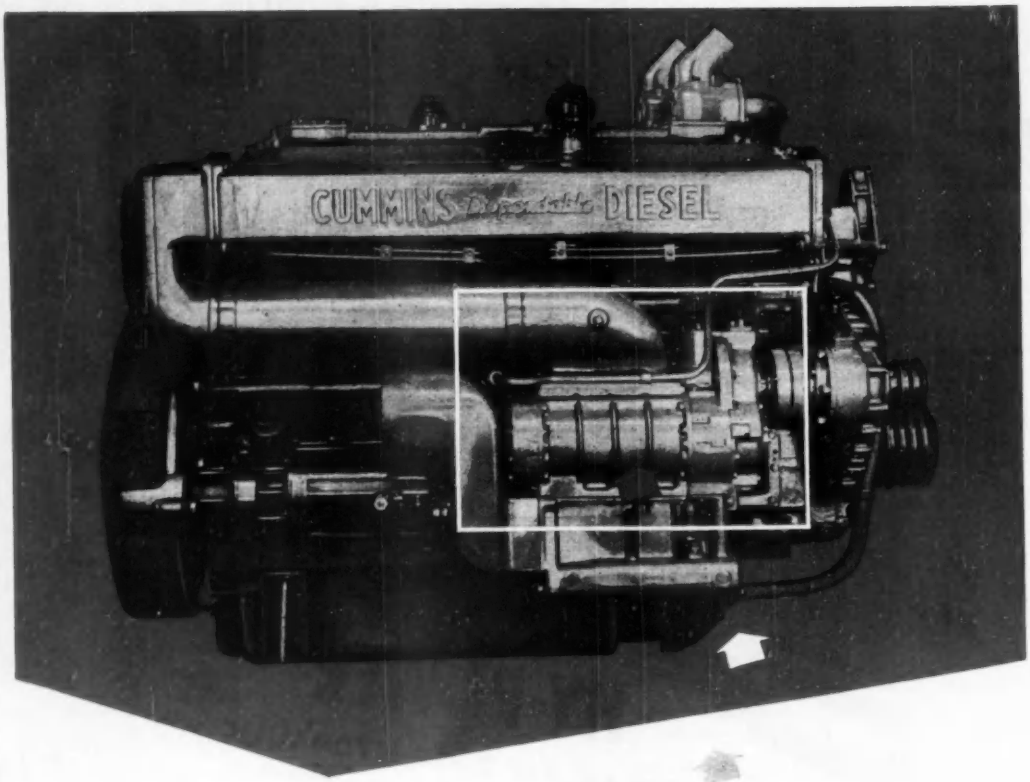
Air and Electro-Pneumatic DOOR CONTROLS





BUILT-IN POWER

Cummins Diesels now have BW Superchargers built-in for added horsepower and economy

Cummins Engine Company, Inc., of Columbus, Indiana, now builds-in BW Superchargers on their new high-speed diesel, model NVHS-1200. This new engine develops 550 h.p. at 2,100 r.p.m. and weighs only *8.3* lbs. per horsepower. The naturally aspirated version, NVH-1200, with the same bore, stroke and cubic inch displacement, as the supercharged engine develops 400 h.p. at 2,100 r.p.m. and weighs *10.8* lbs. per horsepower.

For motor truck, marine, railway or general industrial applications, supercharging means savings in engine space and weight . . . means *power* to pull heavy loads . . . means sea level operation at high altitudes. All these extra benefits without corresponding increases in operating costs.

The engine manufacturer who wants to pack more power into a given engine size . . . or who wants to add an entire new series of models to his line without re-tooling or the expense of redesign, can do so simply by equipping his present line with BW Superchargers. One of our engineers will gladly explain how this can be done. There is no obligation. Write today to

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PRODUCTS DIVISION

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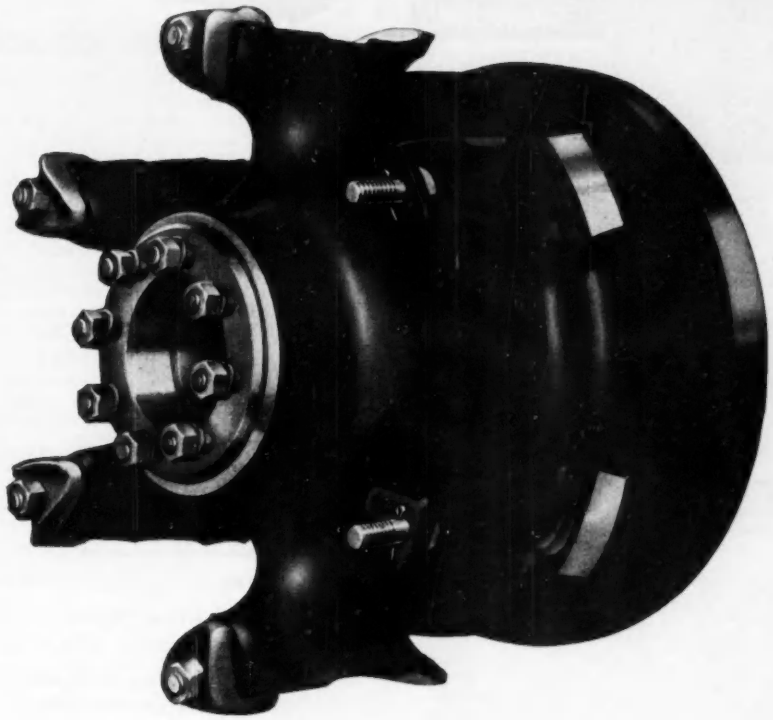

for highway trucks and trailers

Assure yourself of minimum wheel and tire assembly time by using GUNITE Wheel Assemblies. Tire mounting requires no special tools . . . is quick, easy and simple. Six floating lug bolts firmly lock dual tires on the wheel. The stronger, lighter tubular-spoke of GUNITE design brings you a more efficient wheel with the proven strength of cast electric-steel. Write for complete information on GUNITE Wheels.

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GUNITE operates three ferrous foundries under one roof:

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Thus GUNITE can provide the best cast ferrous material to suit your requirements.

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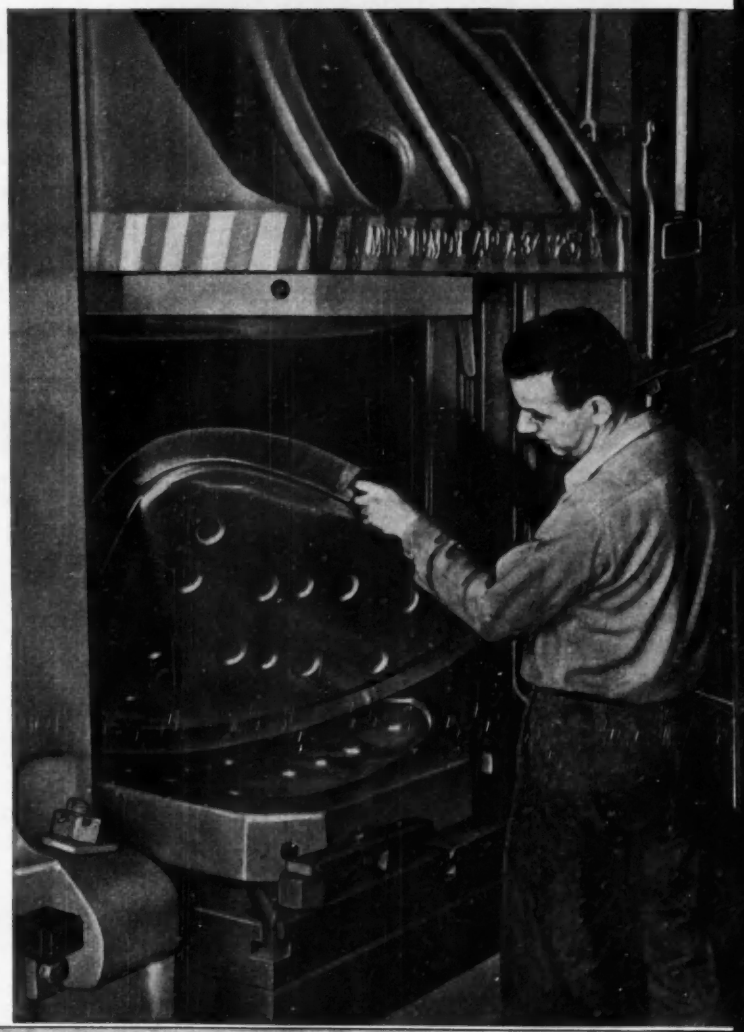
Model "L"

The Hardest Hitting Cecostamp Ever Built



Wider Range of Work: The Model "L" Cecostamp can handle a wider range of work than previous models.

Easier Operation: Concentration of controls makes for ease of operation.

More Accurate Operation: Valve porting and valve rigging give smoother, surer ram action.

Greater Safety: Operational hazards have been largely overcome. Controls are centralized for safety and ease of operation.

Lower Maintenance Costs: New shock absorbing features have been incorporated to cushion vital parts.

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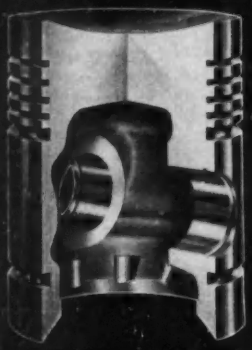

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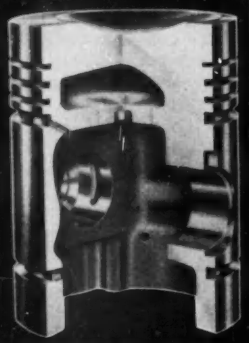

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There's an "Everlock" for Every Lock Washer Need

Four standard types are shown here but if special needs demand others, let Everlock be first to tell you how your *most* exacting specifications can be met.

When ordering screw-washer assemblers from screw manufacturers specify Everlock Washers for quality and fast service.

Ask for the 1950 Catalog. Contains full specifications. Free on request.

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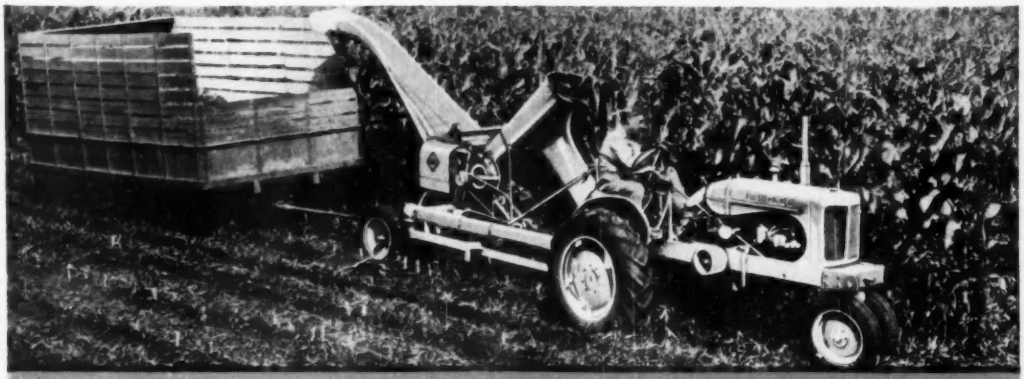
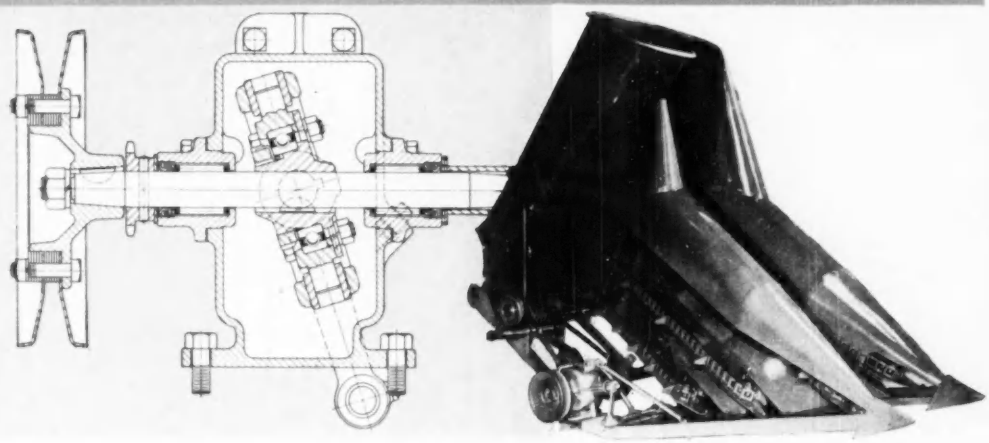
In Detroit: Sam T. Keller Company, 2457 Woodward Ave.



Double Action Bearing



TRANSLATING rotary motion into reciprocating motion for the sickle drive on the row-crop attachment for the Allis-Chalmers Forage Harvester is not a job for a bearing that can't put up with variety in its life—a daily round of dizzy motions and alternating loads.

One compact New Departure single row ball bearing does the job because taking thrust in both directions as well as radial load is fundamental to its design. Without need for adjustments, this bearing uniquely combines the required internal rigidity with utmost freedom of rotation, and here it is fully enclosed against dirt—needs minimum attention for lubrication.

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